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Number 8
October 1985
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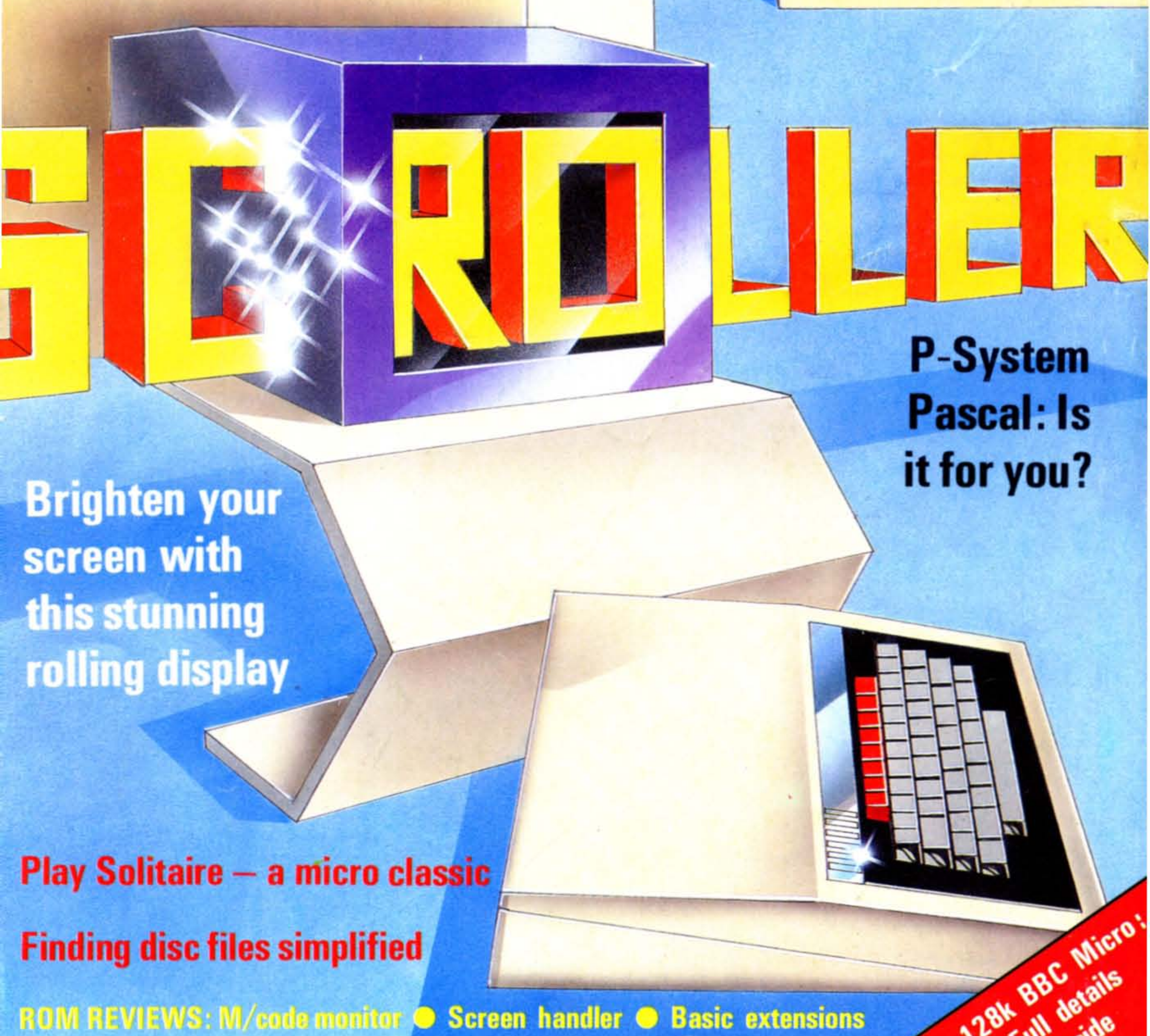

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Vol. 3 No. 8 October 1985

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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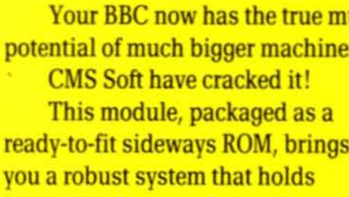

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New Computer Games For Solidisk Sideways RAM

SOLIDISK's SIDEWAYS RAM is an almost indispensible add-on for the BBC user.

It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it.

To date, more than 40,000 units have been sold.

The sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.

This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.

The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.

Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run.

For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.

These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc . . . and Solidsk Most Advanced Disk filing System version 2.0.

Another extremely interesting use is to run Solidisk 'Megagames'. They are too large for the non expanded BBC computer, as they make use of high resolution 8 colour (mode 2) screen, background music, sound and sprites at the same time.

PRICES

The listed price comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and software pack 1 consisting of 5 diskettes formatted either in 40 or 80 track.

- — SWR32 + 5 discs (32k unit, by far the most popular): £58.00
- — SWR64 + 5 discs (64k unit, new introduction model): £85.00
- — SWR128 + 5 discs (128k unit, the second most popular): £135.00
- — Any Extra Software Pack (5 discs): £10.00. Specify 40 or 80 tracks.

As Solidisk Software Support Service has to produce in excess of 25,000 diskettes every month, we regret that we can no longer provide personalised service for disk washing. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost i.e. £10.00 for 5 disks, including new manual, post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment for the difference.

The listed prices include new manuals when necessary.

SOFTWARE PACK 1

(included with SWR)

The Software package comprises 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:
Volume 1 contains all the general applications of Sideways RAM. Menu, Printer Buffer, STL DFS 2.0, STL E00, RAMDISK, RFS (Rom generator), Fast Backup.

Volume 2:
Volume 2 contains the Solidisk Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:
Volume 3 contains the Solidisk Macro Basic (a program generator), a Linker-Editor, VMP the Virtual Memory Program, Sigen, a program to create your own dictionary and a sample French dictionary.

Volume 4:
Volume 4 contains the Solidisk Database.

Volume 5:
Volume 5 contains the Solidisk Sprites System.

SOFTWARE PACK 2

(optional)

Volume 6:
Volume 6 contains the Solidisk Spreadsheet.
Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 7:
Volume 7 contains Solidisk Play Tunes System and lots of tunes and write music using ordinary ABCD notation.

Volume 8:
STL Toolkit has 24 star commands (Status, Rwipe, Check, Find, Search and Replace, Mode 8, Join, Keyload, LVAR, Salvage, Expand, Edit etc . . .).
STL SFX is Solidisk screen effects utility. In mode 2, you can scale, move, reverse, mirror etc with superlative ease.
VDURECORDER is another screen aid utility. It remembers everything sent to the screen. When you want it, *REPLAY will show it all over again but with an incredible speed.
Solimon is a machine code monitor for both 6502 and 65C02.

Volume 9:
Volume 9 contains the STL ADFS and disc utilities (see next page).

Volume 10:
Volume 10 contains the Solidisk Teletext Editor.

Megagame Packs:
Around 70 games are currently under compilation.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

Effective from 15th of JULY 85:

FROM:	TO SWR32	TO SWR64	TO SWR128	TO SWR256
SWR 32		£27		
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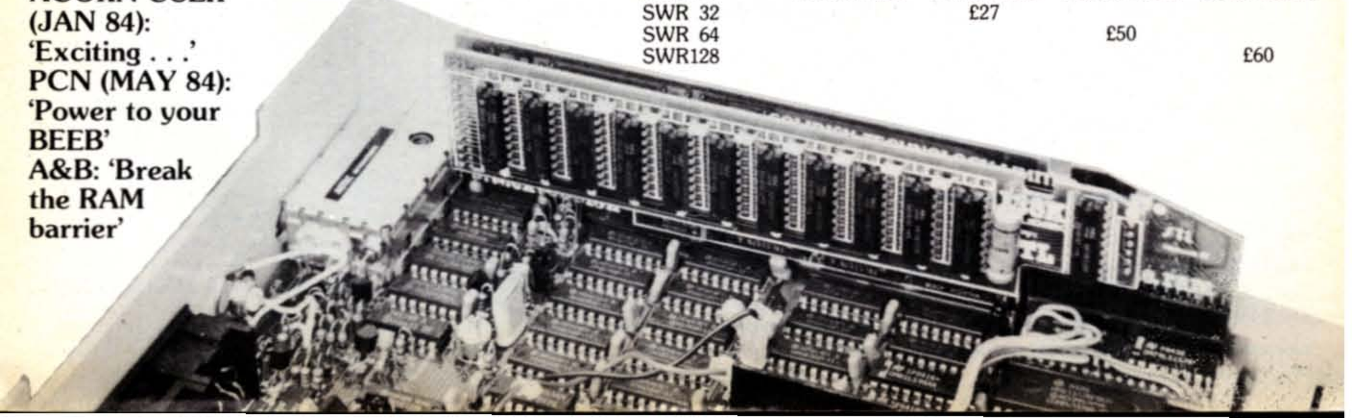

You Only Fit Disks Once. Fit the Best.

The SOLIDISK Double Density DFS is now the ultimate in reliability with a minimum component count and excellent software. The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike. It can now run all Acornsoft games (such as Elite, Aviator, Revs, Magic Mushrooms etc. . .) and most other protected discs (Castle Quest, Island's Music system etc. . .)

SOLIDISK relies on a good product and a large support network to win the heart of the user.

With over 75 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users.

Even users who are new to the Disc System can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility for over 50,000 users and the ability to give you the best possible support matched only by the largest companies.

WHICH DFS DO YOU NEED?

SOLIDISK produce no less than three types of Disc Filing Systems to cover all your requirements.

1. THE FLEXIBLE DDFS

The basic SOLIDISK DDFS is suitable for all ordinary users.

The 1.9 ROM handles both single and double density formats, with built in disc formatter and verifier, along with such features as automatic density sensing and 40/80 track software controlled switching. The disc speed is programmable by the keyboard links to suit almost any type of disc drive.

The 1.9 ROM supports also file size up to disc size.

PRICE

The STL DDFS with 1.9 ROM	£40.00
The STL DDFS with 2.0 ROM	£45.00
The STL DDFS with 2.1 ADFS	£55.00

STL

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SOLIDISK DISK FILING SYSTEM

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2. THE DFDC TO UPGRADE ACORD DFS:

Ideally suitable if you already have an Acorn DFS. The DFDC will not only add Double Density capability but also improve the speed of your 8271 chip.

The SOLIDISC DFDC (Dual Floppy Disc Controllers) is making a very large impact on the BBC user community with its versatility.

The DFDC board simply sits in the place of the 8271 FDC chip (i.c. 78) in the BBC. The 8271 is then inserted into the DFDC board and the ROM 2.0 inserted in place of the original DFS ROM.

Once the machine is up and running it is then simplicity itself to change FDC's; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

PRICE

The STL DFDC with 2.0 ROM	£55.00
The STL DFDC with 2.1 ADFS	£65.00

THE SOLIDISK WINCHESTER DISC SYSTEM (XD20-40)

This most powerful Winchester system for the BBC computer to date plugs straight into the 1Mhz bus in a few seconds.

Based around the WD1002 SHD controller, Mitsubishi Winchester drive, Astec PSU and the Solidisk ADFS 2.1, it offers 20 Megabytes (26 MB unformatted) and can easily be upgraded to a theoretical maximum of 1300 Gigabytes.

Its phenomenal capacity, huge potential and excellent features make the most expensive Winchester systems look green.

On the technical side, it has very fast seek and an exceptionally low skew factor of 11 (meaning 3 sectors are read or written in one single revolution). It gets ready very quickly too, needing only a few seconds from power up.

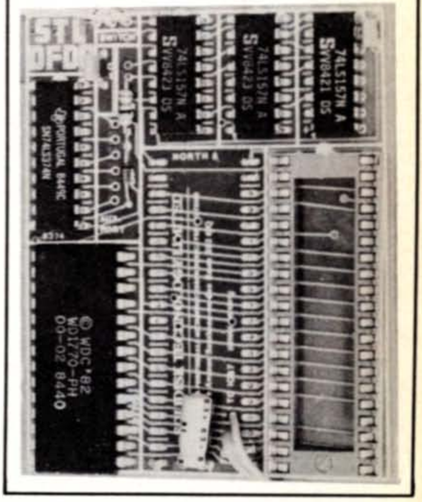
Unlike many other sources of Winchester disc drives, Solidisk Winchester system is properly driven by the Solidisk ADFS 2.1 ROM, compatible with Acorn Winchester specifications and with Acornsoft View, Viewsheet and Viewstore database.

It also runs Gemini's Datagem and Acorn second processors.

It has nice features such as read after write, Password protection, Automatic Winchester to Winchester and Winchester to floppies Backup facilities and a fantastic average file transfer speed of 64k bytes per second.

PRICE:

20 MB Winchester (excluding VAT)	£700.00
30 MB Winchester (excluding VAT)	£900.00
40 MB Winchester (excluding VAT)	£1100.00
60 MB Winchester (excluding VAT)	£1300.00



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YOU SHOULD KNOW ABOUT ADFS AND USE IT

ANNOUNCING THE SOLIDISK ADFS 2.1

What is important on a Disc Filing System is how effectively it uses the disc, how fast it loads the programs, how many entries are on the disc and how big they are.

The old BBC DFS leaves most 80 track discs half empty on side 0 and wastes side 2 of most double sided discs.

The new ADFS treats side 0 and side two (if available) as a single disc and uses them to the full.

The old BBC DFS uses single density, the ADFS double density which is twice as fast and stores twice as much.

The old BBC DFS can only handle 31 files of less than 256k bytes in size.

The ADFS can handle thousands of files, up to 600 Gigabytes in size!

If you are afraid that the ADFS is complicated to learn, don't be put off. It isn't complicated at all.

Most of the commands are the same in both systems and the ADFS ones are very much intuitive.

If you know the BBC DFS, a few hours are all you need to master the new ADFS.

You won't regret it. After all, each ADFS disc saves you £2.00 or more on media cost, and the ADFS ROM will pay for itself in a few days.

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DFS and Acorn BBC Plus users.

This massive piece of software is supplied on two 16k ROMs for the BBC B computers or on a 32k ROM for the BBC Plus computers. It supports both the old BBC DFS and the Acorn ADFS. It also provides the users with 20 extra disc utilities.

Standard features for both implementations include:

1) Automatic Write Error Correction.
Every disk write operation is automatically followed by a read operation to ensure that the recorded data is free of all errors. Then if need be, the STL ADFS 2.1 will restart the write operation from the unsafe sector.

2) Automatic 40/80 track stepping.
The STL ADFS will let you read and write 40 track discs on an 80 track drive and copy over from any format to any other format.

3) Disc repair facilities.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), rewrite multiple sectors (*RESTORE), read bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK).

4) Word processing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed in any screen mode.

5) Automatic disc sensing.
On Shift Break, the STL ADFS will automatically detect the disc format and use the right disc filing system to run it.

Special features for the ADFS implementation:

1) Disc formatting facilities.
*FORM40, *FORM80, *FORM160 and *WFORM (for the Winchester) allow you to format ADFS discs in any drive.

2) Disc verifying facilities.
*VERIFY will check all disc sizes including Winchester for media defects.

3) Number of opened channels.
This is one of the star features of Solidisk ADFS.

This facility (*OPEN) allows you to specify how many files will be opened in a program, thus maximising the available RAM while avoiding buffer page swapping as in the Acorn ADFS.

It leaves PAGE at &1900 for most programs, gives extra memory to View and Viewsheet and also avoids unnecessary conversion work on programs originated for the BBC DFS.

Special features for the BBC DFS implementation.

Solidisk ADFS 2.1 handles both single and double density. In addition, it supports:

1) Unlimited catalogue entries (up to disc capacity) without any preparation.

2) Unlimited filesize.

3) Automatic media detection.

8) PRICE

2.1 ROM set	£20.00
Upgrade from 1.9	£15.00
Upgrade from 2.0	£10.00

SOLIDISK KEYBOARD AND CPU

ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to typists (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be.
Good ventilation to the power supply too and hides all untidy cables away.

PRICE

The complete CPU and keyboard case costs £30.000 inclusive + £3.00 post and packing.
The system could be yours free as part of the Mitsubishi twin discs offer.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK MITSUBISHI DISC OFFER

A Complete Disc System containing everything you need, including 1 Blank Diskette, at a new low price of only £199.00 inclusive.

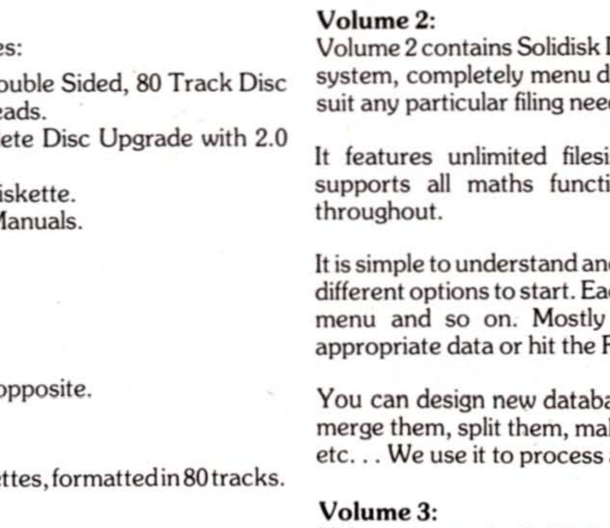
The Mitsubishi Offer Comprises:

— One Mitsubishi MF4853, Double Sided, 80 Track Disc Drive. Cased in beige with all leads.
— One Solidisk DDFS complete Disc Upgrade with 2.0 ROM.
— 1 Verbatim MD525 Blank Diskette.
— 1 Software Pack and User Manuals.
— Full one year guarantee.

PRICE: 200.00.

HARDWARE:
As described earlier as shown opposite.

THE SOFTWARE:
The software comprises 5 diskettes, formatted in 80 tracks.



Volume 1:
Solidisk Word Processor and Spelling checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP filename , then start typing. What you see on the screen will be exactly printed on paper.
Most useful commands are all displayed on the top part of the screen.
It features 80 column screen throughout with direct on screen justification, automatic margins, page numbering, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, *commands etc. Solidisk WP loads and saves texts in under 1 second flat and also you may save the edited version as many times and under any filename you like.

It has the unusual ability to spellcheck your document without leaving it, simply by typing in Control-U.

It has self dictionary generating capability too. You may create any dictionary you like by just simply entering the words.

Solidisk WP is also excellent as secretarial training for Wordstar.

Volume 2:
Volume 2 contains Solidisk Database. It is a random access system, completely menu driven and easily customised to suit any particular filing need.

It features unlimited filesize and number of records, supports all maths functions and 80 column screen throughout.

It is simple to understand and to use. You take one of the 15 different options to start. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design new databases list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. . . We use it to process all your orders.

Volume 3:
Volume 3 contains Solidisk Spreadsheet. Menu driven with standard options to create, edit, recalculate, print, search, sort, report generator and mailmerge.
Unlimited number of rows and columns. Each column can be as small as 2 or as big as 70 characters. All math functions are supported. Complete with home banking and simple portfolio management.

Volume 4:
Volume 4 contains a selection of computer games.

Volume 5:
Volume 5 contains MBASIC, SIGEN and other disc utilities.

IMPORTANT:

If you upgrade to a twin Mitsubishi disc system, Solidisk will offer you, subject to stock availability, a completely free set of CPU and keyboard case as shown earlier.

You should return your disc drive with payment for another Mitsubishi MF4853 (£160.00) or alternatively, save by ordering right now a Fantastic Offer at only £340.00.

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SOLIDISK LOCAL EXPERTS

To add further to the STL support service, Solidisk provide you with a nationwide network of more than 70 local experts.

These people do not sell our equipment but can generally install and check it at absolutely no charge. Once you have our equipment, ring us for the name and number of your nearest local expert.

FITTINGS AND CALLERS

Callers are welcome at our office Mondays to Fridays 9.30 to 5.00, please note that we are closed on Saturdays. Customers requiring fittings must book a prior appointment by telephone.

We would point out that Solidisk hardware and software should not be used for the purpose of infringing copyright.

Short form price list.

Qty Items.	**Prices**	**P&P**
For the BBC B:		
Sideways RAMs:		
SWR32	£58.00	£1.00
SWR64	£85.00	£1.00
SWR128	£135.00	£1.00
CPU & Keyboard Case (both)	£30.00	£3.00
Solidisk DDFS.		
DDFS (with 1.9 ROM)	£40.00	£1.00
DDFS (with 2.0 ROM)	£45.00	£1.00
DDFS (with 2.1 ROM)	£55.00	£1.00
DFDC (with 2.0 ROM)	£55.00	£1.00
DFDC (with 2.1 ROM)	£65.00	£1.00
Special Offers.		
640k Disc Offer	£200.00	£3.00
1.3MB Fantastic Offer	£340.00	£5.00
20MB Winchester	£805.00	£12.00
30MB Winchester	£1035.00	£12.00
40MB Winchester	£1265.00	£12.00
60MB Winchester	£1495.00	£12.00
For the BBC PLUS:		
SWR16+	£58.00	£1.00
SWR64+	£85.00	£1.00
SWR128+	£135.00	£1.00
SWR256+	£190.00	£1.00
640k Disc Offer	£200.00	£3.00
1.3MB Fantastic Offer	£340.00	£5.00
Winchester Units same as above.		
For the ELECTRON:		
EFS	£59.00	£1.00
Special Disc Offer	£200.00	£3.00
Winchester Units same as above.		
Eprom Equipment		
Programmer	£20.00	£1.00
Eraser	£20.00	£1.00
2764 × 5 new low price	£24.00	£1.00
27128 × 3 new low price	£24.00	£1.00
Datalife Diskettes		
MD525 SS/DD	£17.00	£1.00
MD557 2S/4D	£28.00	£1.00
3.5" Datalife	£35.00	£1.00
Misc.		
65C02 with Software	£13.00	£1.00
Solimon-2 16k ROM	£13.00	£1.00
2.0 DFS 16k ROM	£15.00	£1.00
2.1 ADFS 32k ROM	£20.00	£1.00

Total =

Name: ____________________

Address: ____________________

Barclay/Access:

We reserve the right to change prices and specifications for improvement without notice.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

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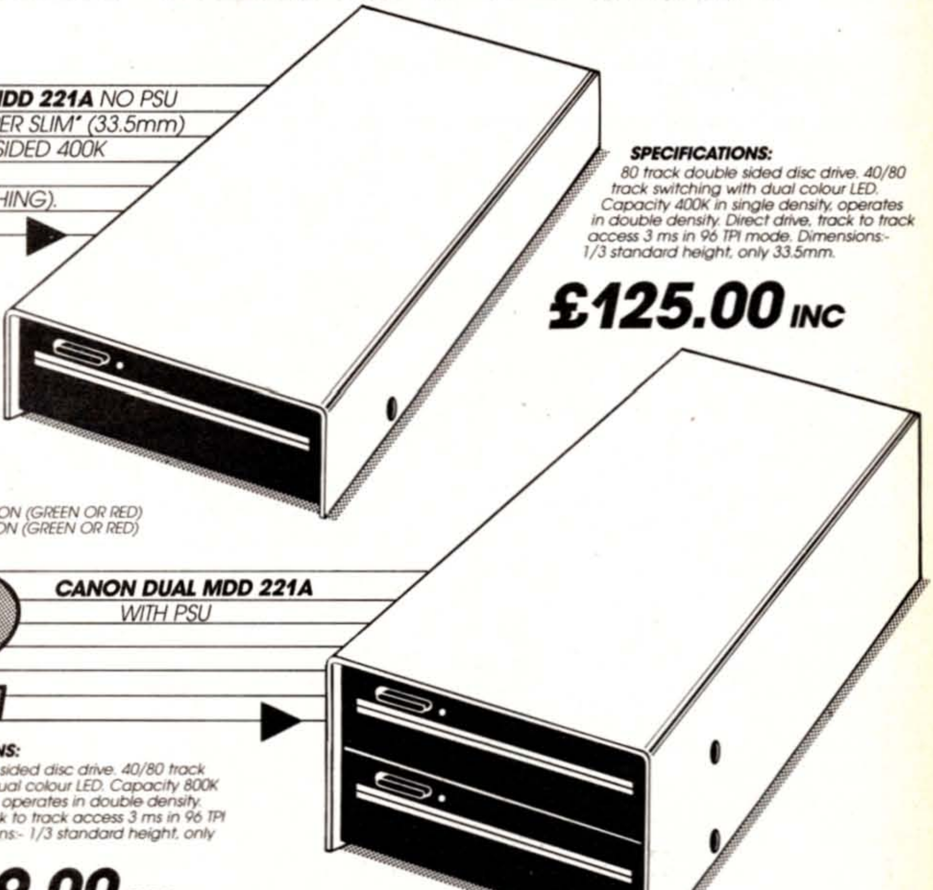


1

CANON SINGLE MDD 221A NO PSU
CANON 221A 'SUPER SLIM' (33.5mm)
80 TRACK DOUBLE SIDED 400K
FLOPPY DISC DRIVE
(40/80 TRACK SWITCHING).

SPECIFICATIONS:
80 track double sided disc drive. 40/80 track switching with dual colour LED. Capacity 400K in single density, operates in double density. Direct drive, track to track access 3 ms in 96 TPI mode. Dimensions:- 1/3 standard height, only 33.5mm.

£125.00 INC

All Canon 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination. To give a clear operating status, as follows.

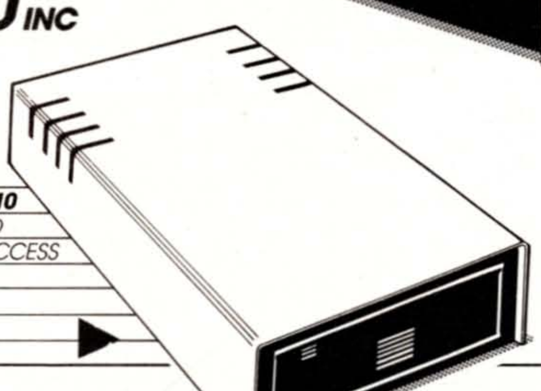
40 TRACK MODE:	LED GREEN
80 TRACK MODE:	LED RED
POWER ON:	HALF-ILLUMINATION (GREEN OR RED)
DRIVE SELECTED:	FULL-ILLUMINATION (GREEN OR RED)

2

CANON DUAL MDD 221A
WITH PSU

SPECIFICATIONS:
80 track double sided disc drive. 40/80 track switching with dual colour LED. Capacity 800K in single density, operates in double density. Direct drive, track to track access 3 ms in 96 TPI mode. Dimensions:- 1/3 standard height, only 33.5mm.

£279.00 INC



3

CANON SINGLE MDD 210
40 TRACK DOUBLE SIDED
6ms TRACK TO TRACK ACCESS
HEAD LOAD SOLENOID
DIRECT DRIVE

£75.00 INC

CHASE DATA LTD THE DISC DRIVE COMPANY WITH DIRECT PURCHASE FROM JAPAN AND A PROFESSIONAL AFTER SALES SERVICE.

4

CHASE DATA SOFTWARE

NOW COMPATIBLE WITH
UDM & OPUS DFS
PLEASE STATE
WHEN ORDERING

VECTOR 1* *The ultimate tape to disc utility. *Vector 1allows you to transfer almost all your tape software to disc. Unlike others, you only need to buy 1 copy of Vector 1 since it transfers tapes to specially formatted program discs. This is easily the most powerful tape to disc utility available.*

Vector 2 New 1.2 VER. Disc to disc utility. *Vector 2 allows you to make backup copies of all your valuable disc software. It is the most advanced utility of its kind available.* ***It is a condition of sale that neither of these products are used for infringement of copyright.***

Vector 1 ***£16*** *On its own*
£15 *If purchased with disc drive*
Vector 2 ***£16*** *On its own*
£15 *If purchased with disc drive*
Vector 1 & 2 ***£30***

5

DISCUS

Test utility for testing your own disc drive, at regular intervals to avoid the dreaded flop of your floppy. Menu driven, easy to use, 40 or 80 track versions.

TESTS: *Motor speed, read/write, steptest, alignment test,* step and read/write test, read only test.*
£8.00 *inc.* ***£7.00*** *if purchased with disc drive.*
**This test requires an oscilloscope and alignment disc.*

EPROMS

QUALITY EPROMS BY 'HITACHI'

2764-250 NS	***£3.00***
27128-250 NS	***£5.00***

INCLUSIVE OF P&P & VAT

6

DIAGRAM

A PROGRAM WHICH ALLOWS YOU TO STORE VERY LARGE DIAGRAMS — UP TO 39 MODE 0 SCREENS — AND VIEW OR EDIT THEM BY SCROLLING THE COMPUTER SCREEN AROUND OVER ANY PART OF THE DIAGRAM

FEATURES

- *Draw diagrams, schematics, plans etc., in any aspect ratio, e.g. 10*3, 2*12 screens.*
- *Access any part of the diagram rapidly by entering an index name, e.g. TR6, R5 etc., to display a specific section of the diagram, and then scroll around to any other part of the diagram using the cursor keys.*
- *Up to 128 Icons may be predefined for each diagram, e.g. Transistors, resistors etc., in full mode 0 definition, up to 32 pixels horizontally by 24 vertically.*
- *Hard copy printouts in varying print sizes up to 9 mode 0 screens on an A4 size sheet, compatible with most dot matrix printers.*
- *Many other features including, selectable display colours, comprehensive line drawing facilities, TAB settings, etc.*
- *Disc contains sample diagrams and two versions of the program, one of which will work from a 16K sideways RAM.*
- *Comprehensive instruction manual.*

£28.75 ***Including P&P & VAT*** *Supplied only on disc 40T/80T compatible.*

DON'T FORGET YOUR VECTOR 1 & 2 WHEN ORDERING.

All inclusive price list: *This means: disc drive + case + all power & data cables + UK carriage + utilities disc & manual + VAT.*

Model	***CANON 210***	***220***	***221A***	***596D***
Formatted Capacity per drive on BBC Micro:	***200K***	***400K***	***400K***	***SANYO 400K***
Single Drive & Case:	***£75***	***£119***	***£125***	***£149***
Single Drive & Case/PSU: **u/c — UPGRADEABLE*	—	***£144***	***£173*u/c***	***£174***
Dual Drive & Case	—	***£229***	—	***£279***
Dual Drive & Case/PSU:	***£185***	***£244***	***£279***	***£309***

FUJI FLOPPY DISCS

	Per box 10	*If purchased with disc drive*
40 TK SS DD	***£17.60***	***£15.60***
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80 TK DS DD	***£28.60***	***£26.60***

These prices include VAT & P&P.

Support:
Warranty: All disc drives sold by Chase Data Ltd come with a full one-year warranty on parts & labour with optional extended warranty on all drives.

Extended Warranty
Your Insurance of trouble free operation.
When ordering your disc drive, ask about our second and third year extended warranty scheme. This covers ALL PARTS AND LABOUR and costs from as little as £15.00 on single drives and £23.00 on dual drives.

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By Phone: ***(Tel: 0784-38487).*** *Allow up to 21 days for delivery.*

CHASE DATA

SEE US ON STAND 47 ON THE 27th - 29th SEPTEMBER AT THE BBC MICRO USER SHOW MANCHESTER.

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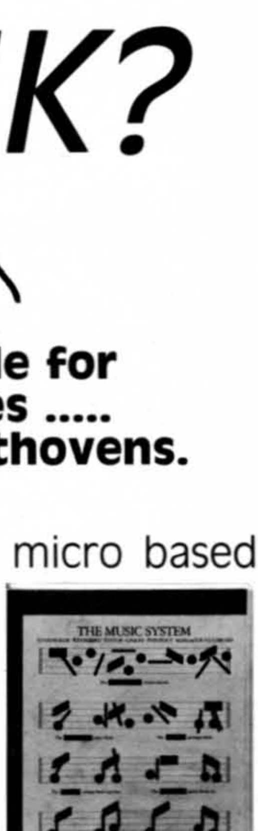
The Music System is now available for everyone ..... toddlers to grannies ..... bathroom virtuosos to budding Beethovens.

The Music System is the most advanced micro based music program for the BBC microcomputer.



It features unparalleled facilities for creating, editing, playing and printing tunes whilst still being simplicity itself to use.

The Song and Sound Library gives you a good start and the acclaimed Instruction Manual leaves little to the imagination.

So there's no need to wait until your hair turns green and spiky ..... use ALL your fingers and brain. Buy one today.

DISC PACK: EDITOR · SYNTHESISER · KEYBOARD · LINKER · PRINTOUT · SONG AND SOUND LIBRARY · £29.95 INC VAT. CASSETTE 1: KEYBOARD · SYNTHESISER · SOUND LIBRARY · £14.95 INC VAT. CASSETTE 2: EDITOR · PRINTOUT · SONG AND SOUND LIBRARY · £14.95 INC VAT. PLEASE ADD £1.25 P&P PER ORDER.

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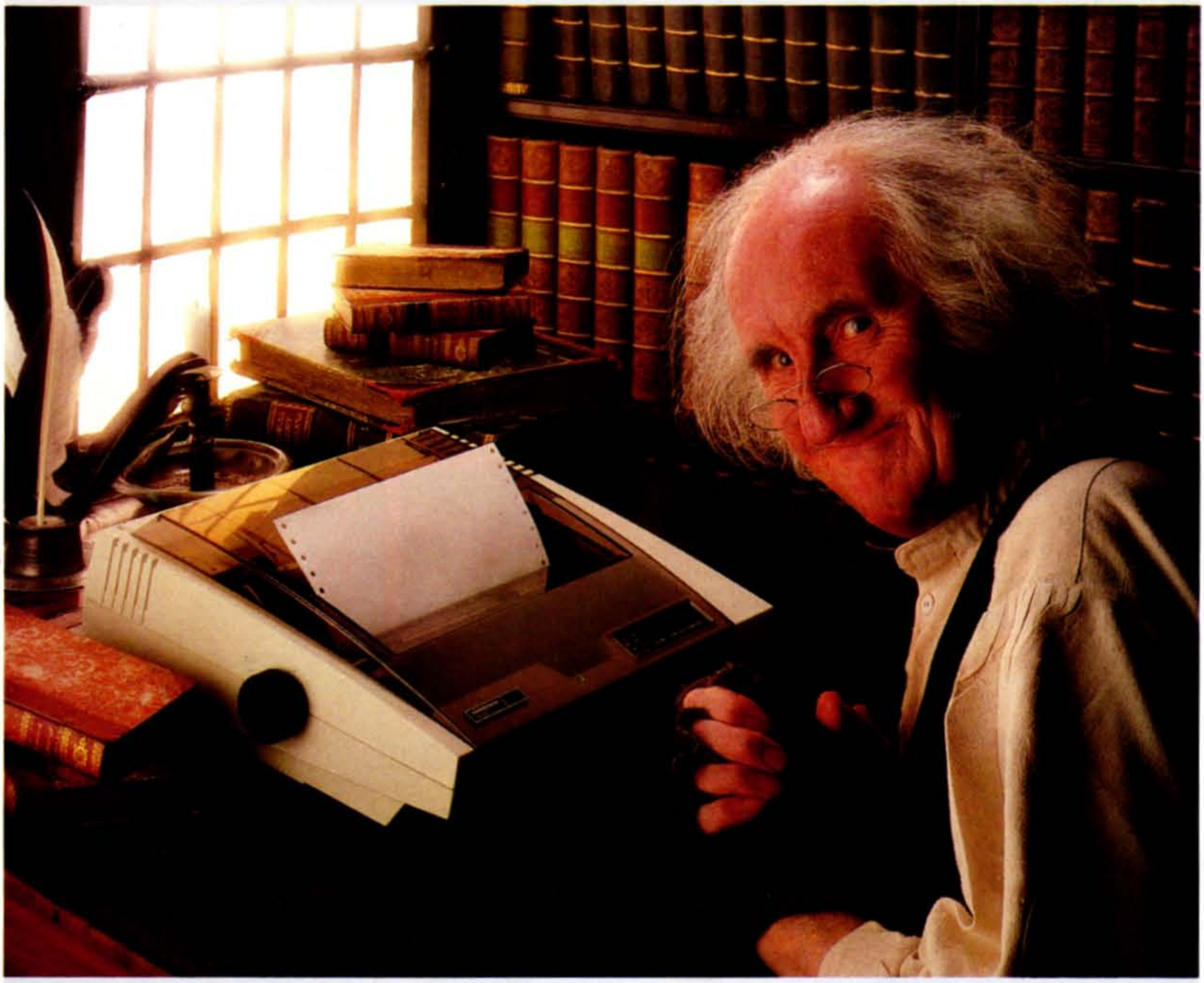
SYSTEM SOFTWARE

Thrifty micro owners choose the new MT80+



Keen on saving money? But not prepared to sacrifice quality and performance? Then the new MT80+ serial matrix printer has plenty to offer at a price that will have you rubbing your hands with glee.

The MT80+ prints at 100 cps and is compatible with just about any popular office or home micro. For true print flexibility, there's compressed and expanded print, subscripts and superscripts, bold print, italics and, of course, graphics.

You'll have to see the print quality to believe it, thanks to the outstanding film ribbon cassette. Continuous fanfold stationery or friction fed single sheets pose no problem. And if you're in a hurry the quick tear facility is a real bonus.

The new MT80+ from Mannesmann Tally. Europe's leading matrix printer manufacturer. You'll be laughing all the way to the bank. Contact us now for our literature pack.

MANNESMANN TALLY

MANNESMANN TALLY LIMITED, MOLLY MILLARS LANE, WOKINGHAM, BERKSHIRE, RG11 2QT. TELEPHONE (0734) 788711

INTER-SHEET

The electronic spreadsheet program

Spreadsheet programs have become powerful and very popular applications for micro-computers, second only to word processors. They can be regarded as a totally general purpose tool.

INTER-SHEET supports a full range of high precision mathematical functions, and a variety of special sheet functions, such as SUM, MAX, MIN, LOOKUP, AVERAGE etc.

Numbers may be printed in three different formats, and with up to nine decimal places. Labels may be left, centre or right justified. All the box formats are alterable on a box by box basis.

INTER-SHEET is supplied on two ROMs. If there is only one socket spare, then it is still possible to access most of the features of INTER-SHEET. The facilities lost are mostly to do with the ROM-LINK integration and multiple spreadsheets.

The INTER-SHEET ROMs are not designed to work with the 2nd processor. However a HI-INTER- SHEET is available on disc that allows 42K of storage on the 2nd 6502 processor. This program requires that one INTER-SHEET ROM is present in the BBC micro, and is supplied at £4.95.

ROM
INTER-SHEET
The spreadsheet program for the BBC Microcomputer
Computer Concepts

Spreadsheet comparisons

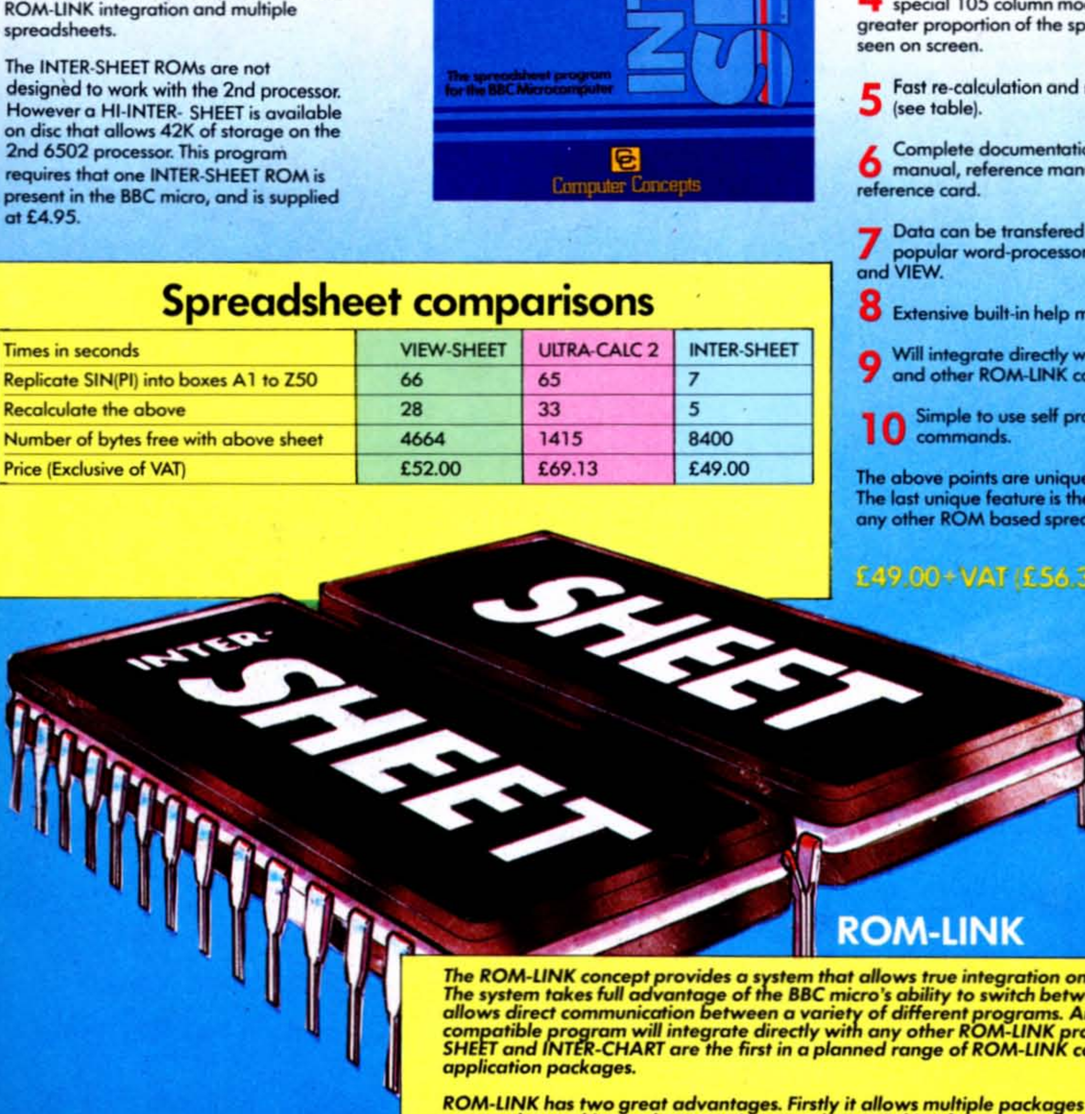
Times in seconds	VIEW-SHEET	ULTRA-CALC 2	INTER-SHEET
Replicate SIN(PI) into boxes A1 to Z50	66	65	7
Recalculate the above	28	33	5
Number of bytes free with above sheet	4664	1415	8400
Price (Exclusive of VAT)	£52.00	£69.13	£49.00

From the same stable as WORDWISE, INTER-SHEET is the first of a new generation of programs, and provides the most powerful and flexible spreadsheet on the market for this machine. This package has many quite unique features–

1. Up to 16 spreadshcets in memory at the same time.
2. Data from one spreadsheet can be used directly by others.
3. Compact, tokenised data storage means that larger than normal spreadsheets can be supported.
4. 40, 80 or 105 column screen modes. The special 105 column mode allows a far greater proportion of the spreadsheet to be seen on screen.
5. Fast re-calculation and replication times (see table).
6. Complete documentation—an introduction manual, reference manual and quick reference card.
7. Data can be transfered to and from popular word-processors like WORDWISE and VIEW.
8. Extensive built-in help menus.
9. Will integrate directly with INTER-CHART and other ROM-LINK compatible products.
10. Simple to use self prompting commands.

The above points are unique to INTER-SHEET. The last unique feature is the price, lower than any other ROM based spreadsheet.

£49.00+VAT (£56.35)



ROM-LINK

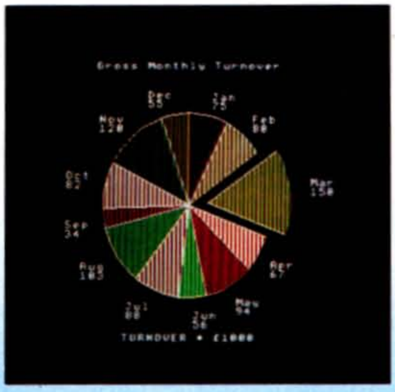
The ROM-LINK concept provides a system that allows true integration on the BBC machine. The system takes full advantage of the BBC micro's ability to switch between ROMs and allows direct communication between a variety of different programs. Any ROM-LINK compatible program will integrate directly with any other ROM-LINK program. INTER-SHEET and INTER-CHART are the first in a planned range of ROM-LINK compatible application packages.

ROM-LINK has two great advantages. Firstly it allows multiple packages (up to 16) to occupy the machine at the same time, so when switching from one task to another there is

INTER-CHART

The chart and graph plotting program

The perfect partner for INTER-SHEET, allowing data to be displayed in a variety of graph formats. Strings of numbers are usually difficult to digest, and it is almost impossible to find any trends in data when displayed numerically. However when displayed graphically even the most complex data can be easily studied.



INTER-CHART can accept data from three quite distinct sources. Firstly, directly from other ROM-LINK packages such as INTER-SHEET. Data can be obtained directly from any box, row, column or area of the spreadsheet.

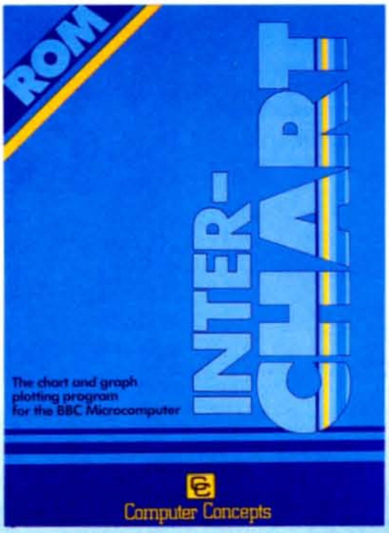
Secondly, data can be entered at the keyboard. At the simplest level the user can type in a series of numbers, and a graph will be plotted from that data.

Thirdly, data can be read from ASCII files on disc or tape. This enables data to be used from other languages or programs or from practically any source that can store the data onto file in the first place.

£32.00+VAT (£36.80)

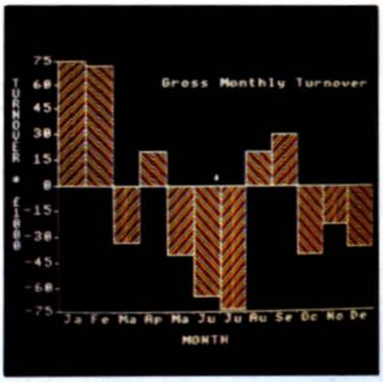
Available from all good software dealers or directly from ourselves at the address below.

ROM-LINK


ROM
INTER-CHART
The chart and graph plotting program for the BBC Microcomputer
Computer Concepts

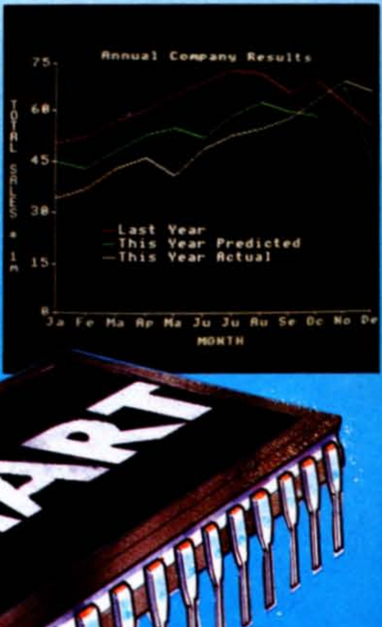
INTER-CHART supports three main types of graph. The pie chart, the line graph and the bar chart. In the pie and bar chart any particular element of data can be highlighted.

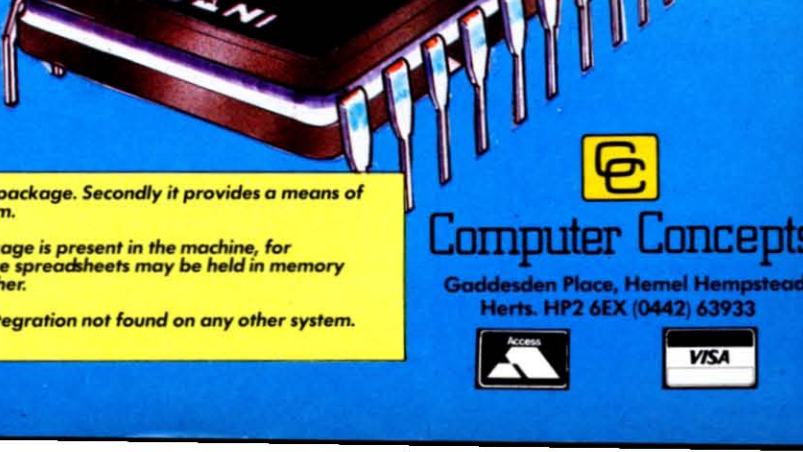
Up to 16 separate sets of data (graphs) can be held in INTER-CHART, but because this product is ROM-LINK compatible up to 16 separate INTER-CHARTs can be on the go at once. Many graphs can be overlayed on top of each other (not pie charts) so comparisons can be made between separate sets of data.



INTER-CHART has screen dump facilities for EPSON compatible printers although other printers can be catered for.

Supplied with a full manual and fitting instructions.





no need to save the data before entering the next package. Secondly it provides a means of directly transferring data from program to program.

The system works even if only one ROM-LINK package is present in the machine, for example INTER-SHEET. In this case up to 16 separate spreadsheets may be held in memory and any spreadsheet can use the data from any other.

The ROM-LINK concept will provide a degree of integration not found on any other system.

Computer Concepts
Gaddesden Place, Hemel Hempstead,
Herts. HP2 6EX (0442) 63933

Access VISA

p&h electronics Ltd

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Epson FX80 +	£385.00
Epson NLQ Board for RX and FX +	£119.00
Epson LX80 with NLQ	£255.00
Epson LX80 Tractor Unit	£25.00
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CD200 Dual 100k S/S with P.S.	£235.00
CD400 Dual 200k D/S with P.S.	£280.00
CD800 Dual 400k D/S 40/80T	£299.00
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CSX354 3.5in 400k D/S 80T	£190.00
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AMX Mouse	£75.00
AMX Utilities Software	£13.50
AMX Desk	£22.00
AMX Paintbox	£13.50
Modem Nightingale with Commstar	£155.00
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View Store – Database ROM	£52.00
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View Guide Book	£3.00
Into – View Book	£3.00
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Creative Graphics	£7.50
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Lisp Manual	£7.50
Forth manual	£7.50
Pascal Manual	£7.50
Comal Manual	£11.50
BCPL Manual	15.00

ACORNSOFT

Forth Cassette	£16.50
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Forth ROM	£47.00
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Comal ROM	£47.00
Logo ROM	£65.00
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Repton	Cas. £9.50 Disc £11.50

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Wordwise Plus	Rom	£49.00
Intersheet	Rom	£50.00
Interchart	Rom	£34.00
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Printmaster	Rom	£29.00
Graphics	Rom	£29.00
Caretaker	Rom	£29.00
Accelerator	Rom	£60.00
Speech	Rom	£29.00
Termi II	Rom	£32.00
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Murom (Music)	Rom	£28.00
Master File II	Disc	£18.00
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Spellcheck II (View + W/W)	Rom	£30.00
Spellcheck (View)	Disc	£18.00
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Enigma Disc Imager is a 16K ROM which will give you 29 additional powerful disc commands. Some of which are: Enigma will IMAGE ANY DISC, Copy sectors, Repair bad tracks, Read deleted or special sectors, Dumps roms to disc, Loads roms from disc to sideways ram, Moves a programme up or down in memory, Unlocks locked tapes, Locks your tapes, Dumps cassette to disc, Global or selective renaming of directories, Writes deleted or special sectors to disc, Track and sector ID editor facilities, Selective file copier, Formats discs to be 40/80 track compatible (requires an 80 track drive with this command), Special disc editor to cope with protected discs, Special formatter to format discs with non standard tracks, Inserts new files into the catalogue, Enigma makes easy work of editing, copying, repairing, etc., of both standard and non standard discs.

ALTRA ENIGMA DISC IMAGER IS TUBE COMPATIBLE

ALTRA PROBE

Altra Probe is a 16K ROM which will give you 59 additional powerful machine commands. Some of which are: Altra Probe will list a basic programme straight from file, Formats basic assembler text output, Dissembles, Unpacks, Super Packs, Relocates, Edits memory, Switches off roms, Lists roms, Copies roms to specified address. Calculates free memory, Copies screen text to printer, Lists all specific types of basic variables and values, Graphics dump for Epson or NEC printers, Calculates and details free space on a disc, On board formatter which will automatically format a dual disc, Onboard formatter and verifier. Repairs bad tracks, Disc sector editor, Turns the tube on and off. These are only a few of the commands available from Altra Probe. Altra Probe makes easy work of editing, programme development, etc.

Altra Probe is available in two versions. PROBE1 and PROBE 2.

ALTRA PROBE 2 IS TUBE COMPATIBLE

ALTRA BASIC ED

Basic Ed, is on 8K ROM which contains 21 additional commands. They are: $ search, List matches, Number matches, Global replace, Selective replace, Bad programme relink, Copy lines from one part of a programme to another. Format a listing, Move, Super pack, Renumber, Table line references, Unpack, Variables X ref, List entire programme, Keyboard immediate mode, Printer on/off, Paged mode on/off, List match lines, Concatenate, Strips rems, spaces etc. Altra Basic Ed, is an essential helpful tool for the Basic/Assembler programmer. Altra Basic Ed. is available in two versions. Basic Ed.1 and Basic Ed. 2.

ALTRA BASIC ED. 2 IS TUBE COMPATIBLE

ALTRA FIRST AID 1.1

First Aid 1.1 is an 8K ROM which contains 19 additional commands. They are: Machine code dissembler, Hex and ASCII dump. Sideways rom to ram copier, Function key predefined facilities, Variable table listing, Memory space free calculator, Checksum calculator, Rom lister, String search, Define function keys with strings, Rem and space Stripper, Bad programme fixer, Clear all variables, Clear ram from &0400 to &8000, Machine code monitor. Lists O.S. calls with their vectors, Lists the first 24 control codes. Altra First Aid 1.1 was designed to assist the Basic/Assembler programmer and the sideways rom user.

ALTRA TUBE EDITOR

ALTRA TUBE EDITOR is a new and unrivalled full labelling Disassembler and editor Rom for the BBC and the second processor. Some utilities of ALTRA TUBE EDITOR are append labels to those in memory, Disassemble in 6502 and 65C02 mnemonics, End file overlay, Delete given label, Delete hex range, Delete markers, Dump memory, Edit memory, Overlay files, Find strings and bytes, Define a hex region, Define a label, List memory, Load labels, List labels, Set memory. Calculate and print values, Print embedded text in a program after a call, Saves Roms, Saves labels. ALTRA TUBE EDITOR also supports many of the 6502 "ILLEGAL" OPCODES.

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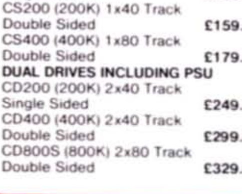

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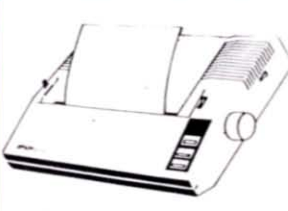

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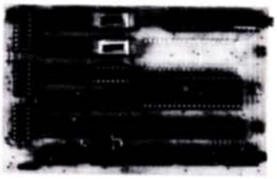

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THE MICRO USER NEWS

October 1985

Arabs want the Oak

A NEWLY launched personal computer based on the BBC Micro is expected to win orders worth £1 million, with a large percentage of the potential business from the Middle East.

The Oak PC is already reported to have exceeded its sales targets by 100 per cent during its first month of trading.

"Response has been fantastic", says David Atkins, head of Oak Universal, the Bradford based company which restyled and revamped both the BBC Micro and the BBC B+ and transformed them into the Oak Personal Computer.

"The Arabs in particular are very interested in the enhanced machines".

NEW CHIP '10 TIMES FASTER THAN IBM PC'

ACORN'S development of a revolutionary new chip – ten times faster than the one at the heart of the IBM PC AT – has led to speculation that the company is developing a new computer.

Rumours started after the company's business division announced the release of the 32 bit chip for evaluation purposes.

Called the ARM – Acorn Reduced Instruction Set Computer Machine – the new processor completed benchmark tests 10 times faster than the IBM PC AT.

It finished in 0.7 seconds compared with its rival's 7.11 seconds.

It also ran compiled code at twice the speed of a VAX II minicomputer.

Cheaper

Apart from operating at an amazing three million instructions a second, the chip is also easier and cheaper to produce in marketable quantities because of its less complex instruction set.

At the moment the 32-bit chip – housed in an 84 pin Jedec B carrier – is being used as a second processor for software development purposes. But the company has not ruled out its incorporation in a new microcomputer.

"Acorn is also interested in third parties taking on the chip", said a company spokesman.

Acorn's Christmas present for B+ users

Upgrade to 128k for £30!

ACORN took the UK computer industry by surprise when it launched a 128k version of the BBC B+ on the opening day of the Personal Computer World show in London.

In the first major product launch of the year to be unbedevilled by leaks, the new model bounced onto the scene – just in time for Christmas – with four times the memory of the original and a full 64k available for Basic programs.

Priced at £499, it is some £30 more expensive than the standard B+. And this is likely to be the price for the upgrade kit which is to be made available for current B+ owners.

However there will be no facility to upgrade the normal Model B to the specifications of the 128k B+.

"Here at last is our answer to all the critics whose only complaint about Acorn machines is that they lack memory", a company spokesman told *The Micro User*.

"It is the only realistic choice for professional or serious applications in its class.

"The 128k not only offers greater data processing power but also dramatically increases the amount of information that can be contained in spreadsheets and databases".

To all outward appearances the 128k version looks like a standard B+, apart from additional decorative emblems.

But an examination of the machine itself reveals it incorporates four banks – each of 16k – of paged RAM.

Also included is a new version of BBC Basic which takes advantage of the extra RAM available, allowing a Basic program of up to 64k to be run.

Acorn claims that the greatest potential for the Paged RAM will be realised when the new model is used in an Econet network.

"Each network machine can load ROM based software – such as Pascal – from the file server into Paged RAM and proceed as if the ROM chip were in that machine", explained an Acorn technical expert.

The company also suggests that the extra RAM can be used as a printer buffer to store characters while printing, so releasing the machine for other work.

However Mike Cook, *The Micro User's* technical editor, said this should be ignored for the time being as there is currently no software available for this facility.

Olivetti's £4m lifesaver

ACORN has undergone a top level management reshuffle in the wake of Olivetti increasing its grip on the company to almost 80 per cent.

The major shake-up was announced at the extraordinary general meeting called to endorse the rescue package. It saw the Italian based multinational acquire 400 million new ordinary Acorn shares for £4 million.

Out goes chairman Dr Alex Reid, the former British Telecom senior executive, to be replaced by Olivetti man Alessandro Uboldi.

Out go co-founders Dr Herman Hauser and Christopher Curry as deputy chairmen but retain their seats on the board.

Out goes Peter Wynn from the board, but he continues as group finance director.

In comes Bruno Soggiu as an Olivetti appointee to the board and non-executive director.

Endorsed

Making his final statement as chairman at the meeting, Dr Reid endorsed a previous forecast that Acorn will achieve £20 million in sales during the second half of this year against £55 million for the same period in 1984.

In the second quarter of this year, it was revealed, the company's turnover had been at 30 per cent of last year's level.

It was left to Dr Reid to point out to shareholders that if it had not been for the Olivetti rescue package, Acorn would have faced the prospect of "imminent receivership".

However the meeting was told that the company has already embarked on a cost-saving plan.

- Research and development has been cut back.
- Staff levels have been reduced.
- "Peripheral activities" have been sold off.

Among the Acorn projects to be abandoned

Turn to Page 24

In full voice

FULL voice control is claimed to be possible for the BBC Micro and BBC B+ with a speech input-output peripheral called Micro-Voice.

From newly formed R&D Speech Technology, it incorporates a loudspeaker, speech recognition and synthesis hardware and a ten word template.

It offers four system commands – to train, talk to, listen to or save a set of words or phrases.

The device simply plugs into an expansion port.

Operating software is provided in the package.

The company says one of the ways of using Micro-Voice, which costs £199, is in playing adventures. The device can be programmed to recognise ten instructions, such as North, up or down, instead of typing them on screen.

But R&D claims it also has many serious applications – in education, the home, telecommunications and in industry.

The company is now working on more professional voice control systems for industrial and scientific users.

Move over, Maxwell!

DESIGN, write, illustrate and print your own newspaper with Mirrorsoft's latest product, Fleet Street Editor for the BBC Micro.

Due out at the end of November it is a full page make-up system aimed at anyone wanting to produce their own newsletters or newssheets.

Users can either put in their own text or draw files from View or Wordwise.

Similarly, graphics can be designed from scratch or drawn from a disc-based library.

The program has a selection of six type faces for text and headlines. Text is laid out in eight panels on an A4 sheet and appears in print as it does on the screen.

There is an automatic dump facility which works with the six most popular printers. The software manual gives help in writing a printer dump program for printers not listed.

The basic, BBC disc version of the Fleet Street Editor, price £39.95, is the first in a line which will include more sophisticated versions for MS DOS and the Atari ST.

Accounting for taste

JUST launched by Meadow Computers is a professional accounting program for BBC Micro users in the wholesale and retail trades.

The company says its Micro-Trader package is for traders who do not require the complex facilities of higher priced systems.

"Yet all the normal accounting requirements are included with fully integrated sales, purchase and nominal ledgers", added a Meadow spokesman.

The nominal ledger can handle 400 accounts with up to 4,000 transactions a month and covers income, expenses, assets and liabilities. It is automatically updated from the other ledgers.

Up to 450 accounts can be held in the sales and purchase ledgers. The sales program allows printouts of all customer invoices and statements to be made.

The purchase ledger presents a monthly statement while payments are automatically deducted from the bank account.

Micro-Trader, a disc-based program, costs £200.

Users' views help re-design Bitstik 2

A COMPLETELY new version of the pioneering Bitstik technical draughting system – dubbed a master of all trades by its manufacturer – has been released for the BBC Micro.

The Bitstik 2, claims Robocom, can be used in architecture, building, all types of engineering, panelwork, packaging, planning, page and form layout, printed circuit boards and presentation graphics.

Written in assembler code, Robocom says the software has been re-designed to take account of user feedback from its earlier systems such as Bitstik 1 graphics.

The Model 2 incorporates a full range of drafting facilities including draw, arcs, adjustable circles, scale, rotation, stretch and merge.

They are operated directly by a precision hand controller so no complex control orders need to be typed in.

Individual drawings can be filed on the system's double sided 5.25 discs.

They can then be used repeatedly for additions, amendments and incorporation into documents.

No cryptic file names are used. Instead, for easy reference the documents in a file are shown in miniature on the screen.

The system package includes A3-4 software but more is available along with a range of precision drawing aids.

Prices are £795 for Bitstik 2, and £450 for an upgrader for the Bitstik 1 graphics system. Education establishments will be given special discounts.

After Band Aid – Beeb Aid

A CAMPAIGN to persuade the home computer industry to participate in raising funds for the starving in Ethiopia is being officially launched at the Electron & BBC Micro User Show in Manchester.

Known as Beeb Aid, it will be linked to Bob Geldhof's Band Aid, and is the brainchild of Nazir Jessa of Watford Electronics.

"I know there are a lot of generous people in this industry", he told *The Micro User*. "So we simply want to channel this generousity in the right direction".

Nazir Jessa and his team have set a provisional target of £60,000 to purchase a lorry and food supplies. These will then be turned over to Band Aid's Truck for Africa relief column.

The Watford boss has already canvassed the managing directors of a number of leading peripheral companies for support – with positive results.

"At least ten of them said 'yes' immediately", he revealed. "So we have picked the Electron & BBC Micro User Show – one of the highlights of the computer year at which everybody who is anybody will be there – to really get it off the ground".

The exhibitors at Umist will be asked to nominate one of their products and pledge a percentage of its sales returns for one month or more.

If, however, they feel the product is not going so well then they can then nominate another or increase the size of their contribution with an additional cash donation.

All the companies involved need to do is arrange for the money to be paid into a special bank account being set up for the fund.

Watford Electronics itself has decided to donate 50 per cent of its profits from Word Aid, its new software for Wordwise Plus – adding a guarantee that a minimum of £2,000 will eventually be handed over.

Sparked

"It was the name Word Aid which sparked off the whole idea", recalls Nazir Jessa. "I kept thinking about its association with Band Aid and that's how Beeb Aid was born".

But why Beeb Aid?

"Well the success of so many companies in the home computer industry has stemmed from the BBC Micro, we felt they would appreciate the name", he said.

Olivetti's £4m lifesaver

From Page 23

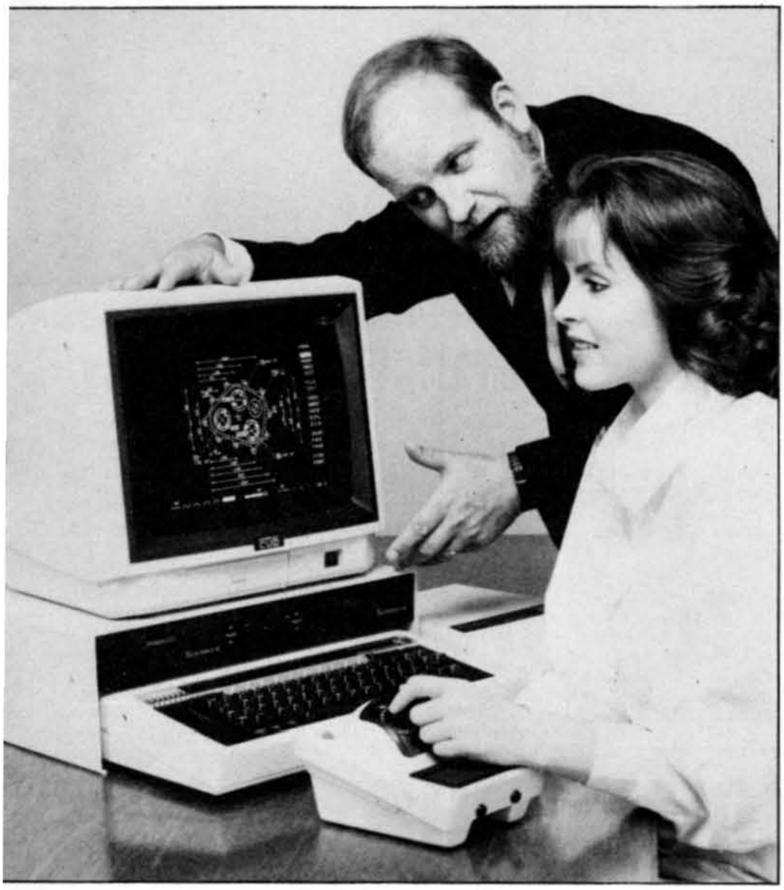
is the Advanced Business Computer.

Research has also been stopped into areas with "no immediate product application" such as voice recognition, satellite communications and artificial intelligence.

New Acorn managing director Brian Long says the company will now concentrate on machines – like the BBC Micro – which are aimed at specific markets.

"Acorn has come through a very difficult period with its key products and employees in place", he said.

"With the refinancing complete, and combined with our customer base, Acorn stands ready to capitalise on its excellent product range and R & D skills".



How to make the most of Wordwise

WORDWISE specialists Norwich Computer Services has come up with the solution to two major problems experienced by Wordwise Plus users.

The company claims it has the answers to beginners not being properly catered for in the reference manual, and the fact that large amounts of text cannot be previewed.

A new book written by Paul Beverley – already the author of two Wordwise books – provides the answer to the first problem.

It contains the principles of the new version plus a whole range of working programs. Priced £7, its 30 program listings are also available on disc for £5.

NCS also believe they have the answer to the problem of previewing large amounts of text.

This is a Continuous Processing ROM, again written by Beverley. It allows documents to be split into a number of smaller files, for lists of the files to be displayed, and quick movement from one file to another.

Different parts of the document can be edited and the ROM will automatically save the edited version before moving on. Facilities include printing and preview of whole or parts of documents or a range of named files, and search an replace.

Priced £15, it comes with a detailed manual.

Both products will be on view at the Electron & BBC Micro User Show from September 27 to 29.

Simplifying Econet with icons

ACORN has joined forces with another company to provide a system which will simplify the general use and housekeeping functions of Econet.

With System Software it is working on a series of icon driven menus called EcoSystem for the network's second and third levels.

Apart from simplifying use the companies claim it will provide a "desk top" front end which users can interface to applications they have bought or of their own development.

Its utilities and menus will include applications, default, automatic assignment of peripherals and file directories, file management, and removal of users from the system.

Micro Live returns

BBC 2 Television's Micro Live series has been brought back as a result of pressure from computer buffs.

Starting on October 13 the – now weekly – series will cover subjects ranging from electronic music, micros in schools, the data protection act and the use of computers in timing races.

The battle for the personal computer market is to be featured in a serious film with a lightweight title, Big Blue and the 700 dwarves. Micro Live will also take an in-depth look at work being done by the Carnegie-Mellom University in the States on molecular memories and robots, at communications, and networking.

These, together with other items still to be filmed, will take the series up to December 13 when it will take a break for Christmas. It will return for another 10 weeks starting January 17.

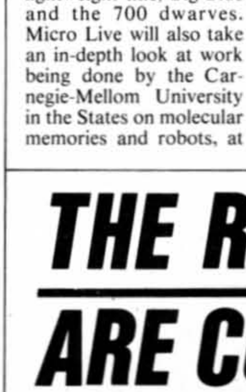
The program's producers have also taken heed of the viewer's mailbag by introducing more items on personal computers. But air time will be given to the growing business and communications sectors.

Presenters of the program will be Lesley Judd, Ian McNaught-Davies and Fred Harris. Micro Live will go out on BBC 2 at 7.30pm each Friday.

THE ROBOTS ARE COMING

SOFTWARE house Martech has introduced two new games for the BBC Micro, both scheduled for release this month.

The Battle Begins is the first in a series of computer games based on the range of Zoid robot toys, UK sales of which have topped £2 million.



Developed in conjunction with toy manufacturers Tomy and comic publishers Marvel, it centres on a battle for supremacy between two warring factions of the dinosaur-like Zoids. Price is £7.95.

● TV personality and world's strongest man, Geoff Capes, has helped Martech develop a new game based on his exploits.

It involves bringing Geoff to the peak of physical fitness for each of several demanding events. Once an event is under way, success depends on timing and quick reactions.

Geoff Capes' Strongman costs £7.95.

HARK!

RELEASED in time for you to get some early singing practice in before Christmas is a program featuring traditional carols.

The words, music and illustrations of seven carols plus a word game called 'The Christmas Tree' are available on cassette for the BBC Micro from Chalksoft, price £5.

Joystick upgrade will help snooker players

A DEVICE that makes analogue joysticks perform like switched ones at the flick of a switch has been produced for the BBC Micro by Voltmace.

The Voltmace ASC is a dual purpose device with two opposite functions.

Firstly it enables an analogue joystick to simulate a switch joystick by giving a full analogue to digital value for only a small deflection from the centre.

Secondly it changes the sensitivity of an analogue joystick by a factor of two. That means a full joystick movement will only give half the A/D voltage change.

The device plugs onto the analogue port socket and replaces it with its own 15 way D socket into which the joystick plugs. Two switches on the top of the box select the function. No software is needed to run the device.

The switched mode is used for games software where the program writer has used A/D values wide apart.

With the ASC in switched mode a slight movement of the joystick in any direction will give the effect of pushing the joystick right over.

The user switches the ASC box off completely to run programs like snooker where the full deflection of the stick is needed to make a strong shot, and the complete range of analogue values is needed to compute the cue angle.

Price: £9.95.

Don't be so naughty

THE imagination of the national Press has been caught by a revolutionary Naughty Words Editor which is currently being tried out by MicroLink, first reported in *The Micro User*.

Publications as diverse as The Times and the Daily Star carried reports on MicroLink's attempt to erase electronic graffiti.

After broadcasting journalists picked up the story, it was transmitted as far afield as Australia.

"It obviously appealed to the Aussies, as their vocabulary of naughty words is known to be quite extensive", observed the radio reporter.

Statistics made easy

UNLESS you have a very analytical brain, producing meaningful statistics from a set of data can prove difficult.

But claiming to make statistics easy is Instat, a statistical computer package for the BBC Micro from Reading University.

Its facilities include simple data summary and presentation, simple and multiple regression, multiway tables, analysis of variances, generation of random samples, plotting and help.

Columns of data can be combined, split, sorted or transformed and stored as worksheets or subsets on disc.

Documentation includes a user guide plus a manual for those who wish to tailor the software for specific applications.

The program was produced jointly over two years by the university's Statistical Services Centre, Sri Lanka's Colombo University and the Centre for Social and Environmental Research, Mauritius.

The price for a single user – both single and multiple licences are available – is expected to be under £100. Educational establishments will receive discounts.

BRINGING DOWN THE COST OF CAD

THE prohibitive price of CAD packages, with their associated computer and plotter – usually costing thousands of pounds – makes it difficult for many teaching establishments to provide equipment for trainees to learn on.

But Kings College Hospital's department of medical engineering and physics has overcome this problem using a combination of a BBC Micro, a Penman 3 colour robot plotter and a low cost CAD package called Micad.

"We usually have four or five apprentices working in the department at any one time gaining practical experience as part of their training", explains Paul Richardson, senior engineer at the department.

"This low cost system enables them to become familiar with CAD and also to produce technical drawings of good enough quality to be used in our engineering section".

One result is that the department has been able to adjust its budget and invest the savings gained from the plotter to buy much more expensive and advanced CAD software than they could have otherwise.

"Because we are also a teaching hospital, the staff produce a large number of scientific papers", said Paul.

"We are buying another Penman unit expressly for the purpose of producing graphical illustrations for these papers, such as pie charts and bar charts.

"It's very compact and portable, which means that it can be easily passed round to the member of staff that next needs it".

This means they were able to write their own programs to help their work.

Paul said he and his colleagues are now looking at various ways in which they can use the Penman system for other than straightforward plotting, such as recording the output from monitoring equipment and probes.

The AMX Mouse down under

FOLLOWING successful sales of its AMX Mouse in Europe, the Middle East, South Africa and Hong Kong, Advanced Memory Systems (AMS) is now going to try its luck down under.

It has appointed Absolute Electronics of Victoria sole distributor for the Mouse and AMS software in Australia.

The distributor's initial instructions are to aim the product at dealers and the education market – where, as in Britain, the BBC Micro is the approved machine.

Said Gerard Richardson of AMS: "We want to see what sort of impression the Mouse is going to make on these sectors before pushing ahead with anything else".

Microweb switches over to MicroLink

MICROWEB, the BBC Micro bulletin board launched by *The Micro User* in June, 1984, is to become part of MicroLink.

In the last 15 months the board has given a lot of pleasure to many users. But it has been facing two major problems.

One has been caused by its own success. The ever-growing number of people trying to access it found that because it was a single line board the telephone number was invariably engaged.

With MicroLink, which has an unlimited number of incoming lines, this problem will never arise.

Microweb has also been restricted to 300 baud access. This has meant that users who only had 1200/75 baud modems were unable to use it.

But MicroLink has multi-baud access, making it available to everyone.

BBC Micro users will be given their own section within MicroLink, where they will be able to talk about their problems – and achievements – for the benefit of other users.

Alan McLachlan, the man responsible for developing Microweb, paid tribute to the remote sysops – system operators – who had devoted many hours of their own time to make a success of the service.

"I hope we will be able to count on their continued support", he said. "They will find that MicroLink will give them many more opportunities for making new contacts and exchanging ideas.

"And never again will they have to face the engaged tone whenever they want to go on-line!"

Micros creating new horizons for the handicapped

CUSTOM designed software for the BBC Micro that is helping to teach mentally handicapped people all over the world is being produced by New Horizon Computer Services, a company set up by mechanical engineer David Regan.

The programs, which are being used as far apart as South Africa and the Shetland Isles, are also suitable for the educationally subnormal, and in some cases for infant and primary schoolchildren.

To date more than 20 special programs have been produced, originated by teachers, instructors and parents who provided Regan with the broad outline of their particular requirements.

New Horizon supplied the programming expertise and customising of the programs, and field testing was undertaken on as broad a base as possible to make the programs suitable for special schools, adult training centres and, where possible, home use.

The programs range from simple graphic responses on touching the keyboard, through serious educational programs to games for hand and eye coordination.

Most of the programs are multi-level and automatically follow the progress of the user, either increasing or decreasing the level of difficulty.

A special feature is their "minimum negative reinforcement" which is designed to offset a mentally handicapped person's inability to recognise a "wrong" move from a "right" one, as all action on the screen appears entertaining and rewarding to them whichever key is pressed.

Problems

Regan says one of his main problems is to get educators to appreciate the difference between his programs and those used in ordinary schools.

"Screen appearance is not always pleasing to the non-handicapped", he says. "For example, clouds are created on screen, figures are cartoon style, but these are often the areas of initial interest to the mentally handicapped.

"Screen layouts are deliberately kept very simple, as too much detail causes confusion".

Regan's programs are supplied on either cassette or an autobooting disc with menu selection of program. There is no protection applied to discs or cassettes.

"We encourage the making of back-up copies", says Regan. "Advice and assistance is available by phone".

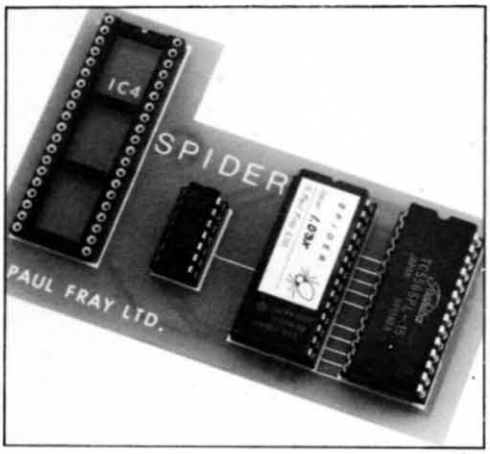
Regan is looking for ideas and finished programs to extend his range.

"We pay modest royalties of between 10 and 25 per cent of sales value to the originator", he says.

"We would also like to hear from holders of copyright on past popular games if they are willing to allow or assist us to produce simplified versions of their programs".

Another innovation of Regan's that will help the mentally handicapped, and young children, is the production of lower case keys for the BBC keyboard to replace the capital letters which beginning learners are often unfamiliar with.

The new keys will be available shortly, says Regan.



Parallel processing with a Spider

A NEW add-on for the BBC Micro from Paul Fray called Spider is a combination of sideways RAM and ROM-based software intended for serious control applications.

It adds a set of real-time I/O tools to BBC Basic and allows the machine a degree of "parallel processing".

Spider also provides a set of process timers that can time out independently of the signals from external devices. The computer can respond to any of these events with Basic procedure calls.

The add-on gets its name from the way it responds to an event in its "web" of sensors. Should another "fly" trigger the web during the period in which it is dealing with the first event its presence can still be noted and dealt with as soon as the first has been secured.

Spider is available in three versions, two with butterfly board, priced from £65 to £115.

Going up..

RISING costs of materials and labour are blamed by Addictive Games for the increase in price of the best-selling program Football Manager from £7.95 to £8.95.

The game has sold more than 130,000 copies since it was launched three years ago, and Addictive says it does not anticipate any decline in sales due to the price rise.

WORKSHOP

ARE you the sort of person who can't bear to be parted from your computer – even when you're away from home? Then Weekend Workshop is for you.

Owners of BBC Micros can spend a few days with fellow enthusiasts at Knuston Hall, Wellingborough, 11-13 October.

Course members using their own computers are aided by experienced tutors who will also give short talks on topics of interest to the group.

The all-in course fee is £35, which covers tuition, board and accommodation.

Making micro music

A TEACH-yourself music package for the BBC Micro, called the Recorder Tutor, has been produced by Mupados.

It displays music notation on screen while simultaneously playing music. Giving a continuous guide to rhythm, it can offer the facility to change tempo, select bars of music and repeat selected passages.

The Recorder Tutor contains 52 pieces of music, plus a reference book for teachers and an audio cassette of performances.

It costs £27 on disc and £25 on cassette, and supplementary packs are also available.

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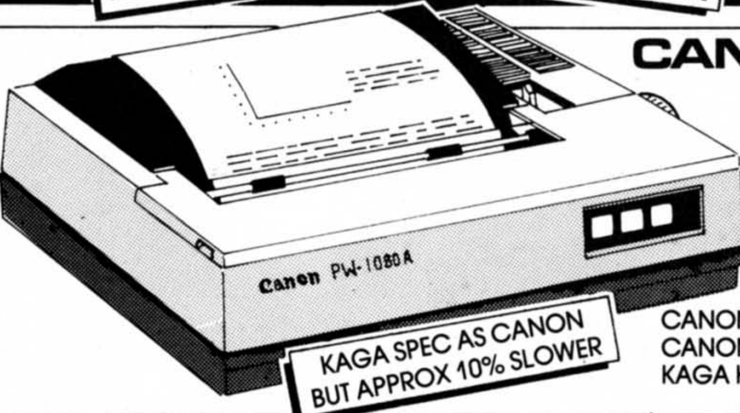

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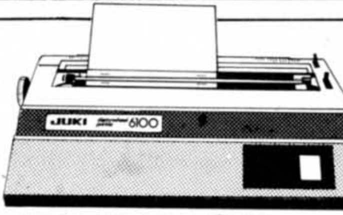

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Mobile micro workshop is under threat

Micro workshop: 'We see this as a job well done'

WHEN the metropolitan boroughs disappear from the municipal map at the end of March so too will a project in which BBC Micros have been helping youngsters learn about computers.

Since 1981 South Yorkshire County Council has been operating a "computers on the move" mobile workshop scheme through its Urban Action Programme.

Thousands of unemployed teenagers – and schoolchildren apprehensive about the advent of the classroom computer – have been given hands-on experience of micro technology.

The project has opened the door to new skills and interests for the jobless and given younger children a boost up the academic ladder.

Run by Norman Warhurst, a systems analyst with the County Council, and his assistant, Sheffield Polytechnic student Keith Renfrey, the unit visits youth centres, probation centres, YTS groups and libraries each weekday for nine weeks during the summer months.

A wide range of computer hardware and software is available free to users, including six BBC Micros.

Warhurst, who has been involved with the unit since its inception, told *The Micro User:* "We are aiming to break down the barriers of 'techno fear'.

"The majority of the youngsters I come into contact with have never used a computer, yet have the 'I'll never get the hang of it' attitude. At the end of each day, however, the majority leave the unit having learnt something about computing.

"As only a small percentage possess programming knowledge we cater for both the complete beginner and the experienced programmer.

"The demand for the unit at Barnsley, Rotherham, Sheffield and Doncaster is enormous. Each user can get a five hour maximum taster course. But we don't expect to turn out experts in a day. If the youngsters are a little more familiar with computers and computing after having attended the workshop then we see this as a job well done".

Although the scheme will die with the County Council next year, Warhurst and others involved hope it will be resurrected and copied by other municipalities across the country.

"It has performed a very useful function in its lifetime and similar projects elsewhere could continue to spread the word that learning about computers can be a painless, enjoyable experience", said a South Yorkshire spokesman.

Could YOU have helped rescue Simon Le Bon?

HOW would you have organised the rescue of Duran Duran singer Simon Le Bon when his £1 million yacht capsized in the Fastnet race? Or helped Virgin empire boss Richard Branson to safety when his attempt to cross the Atlantic in the Blue Riband challenge ended in disaster?

Now you have a chance to try – in Search and Rescue, the latest program for the BBC Micro from Storm Software. Based on real life events it coordinates the actions of lifeboats and helicopters in an emergency off the coast of Dorset.

As soon as an incident is reported it must be located from a screen map showing the Dorset coast from Swanage to The Needles. Taking shipping forecasts into account, the decision whether to alert lifeboats or helicopters, and from which base, must then be made.

For the chosen rescue vessel, directions using points of the compass must be issued and the amount of fuel required calculated. The planned search and rescue is shown with the lifeboat or helicopter moving against a three-dimensional view of the coastline.

A report of the final result is issued to enable the attempt to be assessed. The price is £17.65 for 40 track disc and £18.65 for 80 track disc.

JIM'S AIM IS TO BRING MATHS TO LIFE

WITH the benefit of 27 years of primary school teaching behind him former head Jim Glazzard is now turning his attention to educational software.

He has just finished a mathematics package for the BBC Micro for his company, British Education Software Supplies (BESS).

Called the Kestrel First Collection it contains six programs – Swallows, Spot, Post, Rambling Road, Spider and Cider.

For children from five to 13, it covers simple counting, addition and subtraction, multiplication, co-ordinates, distances, and directions.

Each program has a "real life" rather than abstract theme which children can relate to, says Glazzard – swallows on a telegraph wire, a postman on his round or a fly-catching spider.

Glazzard spent two years testing the collection in primary schools to observe reaction, and he claims there has been a 96 per cent take up from schools who have received inspection copies. But because the market is limited he is also looking for retail outlets.

Programs in the collection cost £6 each or £24 for the full collection on disc, £27 on tape.

Education authorities, however, will be able to purchase a licence to copy. Priced £100 a program, the licence comes with back-up copies and accompanying literature.

Pick a picture – in 3D

A 3D graphics utility has been released by Glentop Publishers for the BBC Micro. It enables the user to create and edit 3D graphic models which can then be saved on disc.

The models can be viewed on screen and manipulated dynamically. Once the desired effect has been created the finished model can be incorporated into the user's own Basic or machine code program.

Priced £25, it comes with a database library disc of models and extensive documentation.

MicroLink
in association with
TELECOM GOLD

No. 2 October 1985

NEWSLETTER

Speeding the mail

THREE years ago the old-style telegram was replaced by the Telemessage. You dictated it by phone and you were guaranteed next day (usually breakfast time) delivery.

The only snag was the cost – £3.50 for up to 50 words.

Now, thanks to MicroLink, a new chapter starts in the Telemessage story. Any home or business micro user can send a Telemessage from his own keyboard in one simple operation.

And the cost? Just £1.25 for up to 350 words, or £1.95 for guaranteed first-post delivery.

Your recipient receives the message exactly as you typed it in – neatly printed out on a letter-quality printer and delivered in a distinctive yellow and blue envelope.

Businesses are expected to be the biggest users of the MicroLink Telemessage service. With the unreliability of first-class post, the promise of next day delivery is a big plus.

Home users will be attracted by the illustrated cards that are available for such occasions as weddings and birthdays – the modern equivalent of the old Greetings Telegram but far more convenient.

There are 16 cards in all, and they cost an extra 65p.

Telemessages (but unfortunately not the colourful cards) can also be sent to any address in the USA, from Alaska down to Hawaii. And other countries will soon be joining the system.

Meanwhile, for the rest of the world you can use MicroLink to send an international telegram, again at a cheaper rate than using the phone.

TELEMESSAGES CHARGES

	UK		USA	
	MicroLink	Phone	MicroLink	Phone
Telemessage 1 *Delivery following day (guaranteed)*				
Up to 50 words	£1.95	£3.50	£2.95	£5.75
51-100 words		£5.25		£8.25
101-150 words		£7.00		£10.75
151-200 words		£8.75		£13.25
201-250 words		£10.50		£15.75
251-300 words		£12.25		£18.25
301-350 words		£14.00		£20.75
Telemessage 2 *Delivery following day (not guaranteed)* Up to 350 words	£1.25	N/A	N/A	N/A
Multiple Telemessages *Same text sent to more than one address.* First message charged as above. Each additional address	£1.30	£1.30	£2.50	£2.50
Special occasion cards	65p	65p	N/A	N/A
Direct response *A reply paid envelope included with your message*	30p	30p	N/A	N/A

INTERNATIONAL TELEGRAMS CHARGES

	MicroLink	Phone
Flat rate basic charge	£1.75	£2.00
Each chargeable word:		
Eire	23p	23p
Bands 1-4 (including all Western and Eastern Europe and North America)	32p	32p
Band 5	38p	38p
Delivery on ornamental form	60p	60p

- *The maximum length of a Telemessage is 350 words or 35 lines of text which is approximately equivalent to an A4 page of text.*
- *The addressee's name and full postal address is free of charge.*
- *All prices are quoted ex-VAT.*

Keeping in touch

FOUR Manchester lads hoping to follow the same route to stardom as another quartet from Liverpool are planning to use MicroLink to keep them in touch with their home base during their tours of Britain and the continent.

Pop group So What will be armed with a portable micro and acoustic modem as well as guitars and drums when they set off for a round of gigs.

MicroLink's electronic mail service will keep them right up to date with what's happening back at the "office".

Getting bigger!

THE host of new services now becoming available have been made possible by MicroLink being given its own dedicated £500,000 mainframe computer at Telecom Gold.

It now has the capacity to expand considerably, and lots of additional services are presently in the planning stage which will enable MicroLink members to participate in the many exciting developments now taking place in the world of communications.

YOUR chance to join MicroLink – turn to Page 71

It has just about every utility you're likely to need

(Electron User)

"This Rom is an absolute winner!"

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16k EPROM
Advanced Disc Toolkit
containing over 30 commands

including
format ● verify
free disc space ● disc editor
menu ● memory editor ● file transfer
memory/disc/basic program search ● file copy
read/write sectors ● load & move file in memory
envelope & function key definitions ● move memory block
compare files/discs ● list file & directory names (ADFS utility)
'unplug' roms ● catalogue roms ● display current filing systems

It's excellent value for money (Acorn User)

Take a close look at 'ADT' it's superb Electron User

INVALUABLE TO EVEN NON- DISC USERS

Advanced Disc Toolkit is a 16k utility ROM designed for both BBC and Acorn Electron computers, and 65C02, Z80 second processors, single and double density disc filing systems, including Acorns new advanced disc filing system, ADFS, Acorn Winchester drive, Econet and sideways RAM. ADT contains over 30 useful utilities to enhance your computer system.

DISC Commands:

Disc sector editor in 40/80 column modes. Disc search for strings/bytes. Recover/restore sectors from any part of a disc. Format/verify any number of discs in one command. Compare discs. Backup discs using 2nd processor memory. Display free space map, free/used files. Electron ADFS disc utilities, format/verify/backup/build/list/type. Dual catalogue.

(ADT will operate with any DFS which is fully compatible with the Acorn DFS)

MEMORY commands:

EXAMINE/MODIFY/PRINT memory in any mode in IO/Second Processor memory/Roms /Rams as 65C02 bi-directional disc disassembler/hex/ascii in variable line sizes, in a predefined window. Search IO/Second Processor/Roms /Rams for strings or bytes. Search for variable names in BASIC/ HIBASIC. Move memory between IO/Second Processor/Roms/ Rams.

Due to the success of ADT, we are able to maintain the price of £29+p&p (£30+VAT)

Quite simply . . . . the ultimate Toolkit

OTHER commands:

Transfer files between filing systems, eg TAPE, DISC, ADFS, NET. Display catalogue of all Roms. Turn off sideways Roms. List envelope/key definitions. Load/Run programs from DISC/NET/below page (& E00). Run any file type from DISC/NET/ADFS from a menu in 40/80 column modes. Change a files load/execution address. Compare files. Display files in all directories. Display all directory names. Backup files in same directory. Dump files in 65C02 disassembler/hex/ascii in variable line sizes.

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Advanced Rom Adaptor I

Now you can gain access to many existing EPROMS by simply inserting them into this budget adaptor cartridge that plugs into the Plus1.

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Advanced Rom Adaptor II

As the ARA 1 but with 2 sockets, it is now possible to have 4 EPROMS' on line without attatching bulky interfaces. A key feature of this product is the built in facility to upgrade to 8k or 16k RAM.

£12 +p&p & VAT

Advanced Electron DFS

This EPROM allows ELK and Plus 3 users to use both ACORN DFS'S; ADFS & 1770 DFS (as supplied in the BBC B+). Now you can load, chain etc. compatible BBC disc-based software.

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Advanced Computer Products

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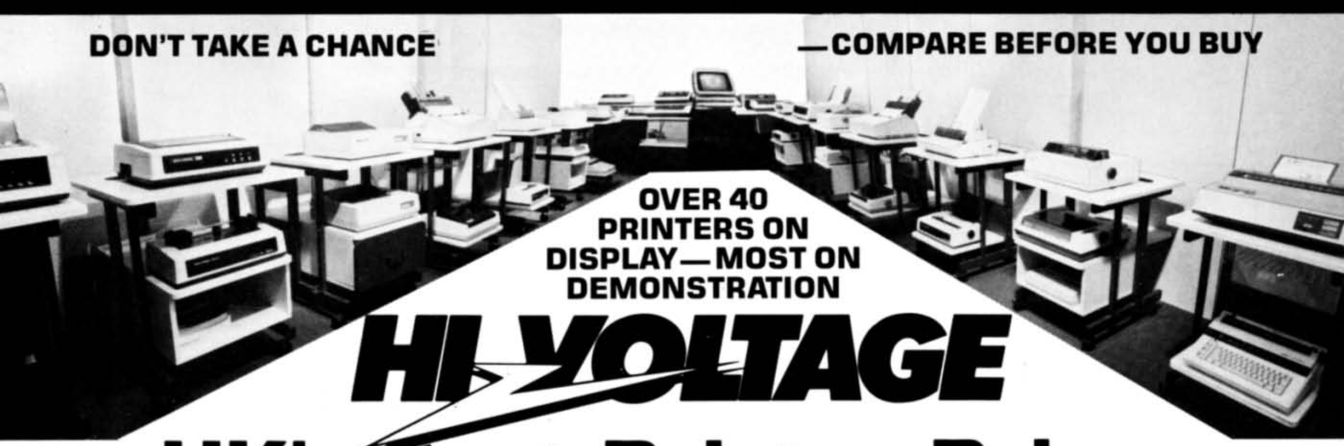

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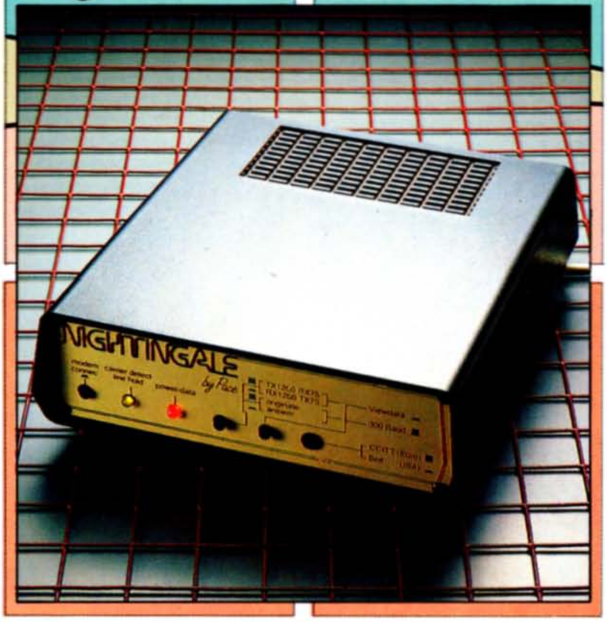

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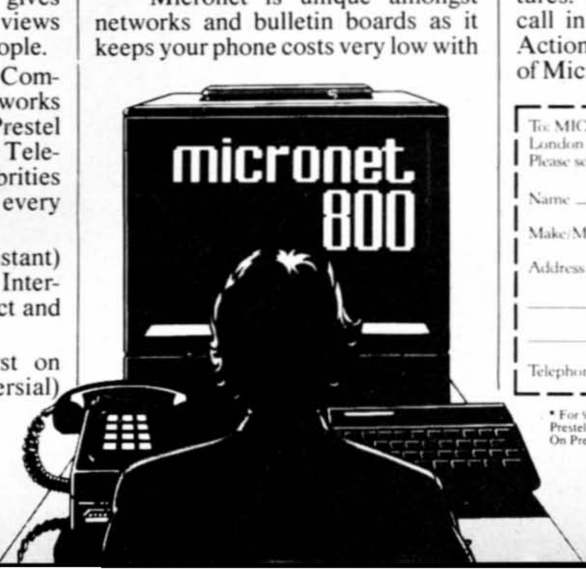

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Bournemouth. Boots, 18-20 Commercial Road. Tel: 0202 21713.
Fareham. Electronequip, 36-38 West Street. Tel: 0329 230670.
Fareham. Boots, 21 Westbury Mall. Tel: 0329 232011
Portsmouth. Micro Choice, 159 Havant Road, Drayton. Tel: 0705 327591.
Portsmouth. RDS Electrical (Portsmouth) Ltd, 157-161 Kingston Road. Tel: 0705 812478.
Portsmouth. Boots, 194/204 Commercial Road, Tel: 0705 825248.
Southampton. Boots, 23-29 Above Bar Street. Tel: 0703 333983.
Waterlooville. GB Microland, 7 Queens Parade, London Rd. Tel: 0705 259911.

HERTFORDSHIRE

Potters Bar. The Computer Shop, 197 High Street. Tel: 0707 44417.
Stevenage. DJ Computers, 11 Town Square. Tel: 0438 65501.
Watford. SRS Microsystems, 94 The Parade, High Street. Tel: 0923 26602.
Welwyn Garden City. DJ Computers. 40 Fretherne Road. Tel: 96 28444

HUMBERSIDE

Beverley. Computing World, 10 Swabys Yard, Dyer Lane. Tel: 0482 881831.
Grimsby. R.C. Johnson Ltd, 22 Friargate, River Head Centre, Tel: 0472 42031.
Hull. Boots, 48-58 Prospect Centre. Tel: 0482 22334.
Hull. Computer Centre, 26 Analby Road. Tel: 0482 26297.

ISLE OF MAN

Douglas. T.H. Colebourn, 57-61 Victoria Street. Tel: 0624 73482.

KENT

Ashford. DGH, 10 North Street. Tel: 0233 32597.
Beckenham. Supa Computers, 425 Croydon Road. Tel: 01-650 3569.
Bromley. Boots, 148-154 High Street. Tel: 01-460 6688.
Chatham. Boots, 30-34 Wilmott Square, Pentagon Centre. Tel: 0634 405471.
Gravesend. Gravesend Home Computers, 39 The Terrace. Tel: 0474 28871.
Folkstone. Boots, 24-26 Sandgate Road. Tel: 0303 54007
Maidstone. Boots, 56-62 King Street. Tel: 0622 53912.
Maidstone. Kent Micros, 52 Union Street. Tel: 0622 52784.
Rainham. Microway Computers, 39 High Street. Tel: 0634 376702.
Sevenoaks. Ernest Fielder Computers, Dorset Street. Tel: 0732 456800.
Shortlands. The Village House of Computers, 87 Beckenham Lane. Tel: 01-460 7122.
Sittingbourne. Computer Plus, 65 High Street. Tel: 0795 25677.
Tunbridge Wells. Boots, 7-11 Calverley Road. Tel: 0892 26486.
Tunbridge Wells. Modata Computer Centre, 28-30 St. Johns Road. Tel: 0892 41555.

LANCASHIRE

Blackpool. Boots, 28-38 Bank Hey St & Victoria St. Tel: 0253 22276.
Blackpool. Blackpool Computer Store, 179 Church Street. Tel: 0253 20239.
Bolton. Computer World UK. 208 Chorley Old Road. Tel: 0204 494304
Burnley. IMO Computer Centre, 39-43 Standish Street. Tel: 0282 54299.
Lancaster. Northern Lights, 89 Scotforth Road. Tel: 0524 62634.
Preston. 4Mat Computing, 67 Friargate. tel: 0772 561952.
Rochdale. Boots, 50 Market Way. Tel: 0706 53225.

LEICESTERSHIRE

Leicester. Boots, 30-36 Gallowtree Gate. Tel: 0533 21641.
Leicester. DA Computers 104 London Road. Tel: 0533 549407.
Market Harborough. Harborough Home Computers. 7 Church Street. Tel: 0858 63056.

LONDON

W1. Computers of Wigmore Street, 104 Wigmore Street. Tel: 01486 0373.
W1. Galaxy. 230 Tottenham Court Road. Tel: 01-636 6500.
W1. Sonic Foto Micro Center, 256 Tottenham Court Road, Tel: 01-580 5826.
W1. Tomorrows World Today, 27 Oxford Street. Tel: 01-439 7799.
WC1. Transam Micro Systems, 59-61 Theobalds Road. Tel: 01-405 5240.
W8. Boots, 127a Kensington High Street. Tel: 01-937 6882.
SE7. Vic Oddens Micros, 6 London Bridge Walk. Tel: 01-403 1988.
SE15. Castlehurst Ltd, 152 Rye Lane, Peckham. Tel: 01-639 2205.
EC2. Devron Computer Centre, 155 Moorgate. Tel: 01-638 3339.
N14. Logic Sales, 19 The Bourne, The Broadway, Southgate, Tel: 01-882 4942.
N22. Boots, 38-40 High Road, Wood Green. Tel: 01-881 0101.
NW4. Davinci Computer Store, 112 Brent Street, Hendon. Tel: 01-202 2272.
NW4. Boots, Brent Cross Shopping Centre. Tel: 01-202 5256/7.
NW11. Computers Inc, 86 Golders Green. Tel: 01- 209 0401.

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Altrincham. Boots, 13-17 George Sreet. Tel: 061-928 4471
Hyde. C Tech Computers, 184 Market Street. Tel: 061-366 8223
Manchester. Boots, 32 Market Street. Tel: 061-832 6533.
Manchester. Mighty Micro, Sherwood Centre, 268 Wilmslow Road, Fallowfield. Tel: 061-224 8117.
Manchester. NSC Computer Shops, 29 Hanging Ditch. Tel: 061-832 2269.
Marple. Marple Computer Centre, 106 Church Lane. Tel: 061-449 9933.
Oldham. Home & Business Computers, 54 Yorkshire Street. Tel: 061-633 1608.
Oldham. Boots, 1 Town Square Shopping Centre. Tel: 061-624 2525
Stockport. National Micro Centres, 36 St Peters Gate. Tel: 061-429 8080

MERSEYSIDE

Liverpool. Hargreaves, 31-37 Warbreck Moor, Walton. Tel: 051-525 1782.
St Helens. Microman Computers, Rainford Industrial Estate, Mill Lane, Rainford. Tel: 0744 885242.
Southport. Boots, 31-39 Chapel Street. Tel: 0704 33907.
St. Helens. Boots, 8 Church Street, 24 La Grange Arcade. Tel: 0744 25488.

MIDDLESEX

Harrow. Camera Arts, 42 St. Anns Road, Tel: 01-427 5469.
Hounslow. Boots, 193-199 High Street. Tel: 01-570 0156.
Southall. Twillstar Computers Ltd, 7 Regina Road. Tel: 01-574 5271.
Teddington. Andrews, Broad Street. Tel: 01-977 4716.
Twickenham. Productive Computers Ltd, 72 Heath Road. Tel: 01-891 4991.
Uxbridge. JKL Computers, 7 Windsor Street. Tel: 0895 51815.

NORFOLK

Norwich. Adams, 125-129 King Street. Tel: 0603 22129.
Thetford. Thetford CB & Micros, 21 Guildhall Street. Tel: 0842 61645.

NOTTINGHAMSHIRE

Mansfield. Boots, 39 Four Seasons Shopping Centre, Tel: 0623 23089.
Nottingham. Boots, 11-19 Victoria Centre. Tel: 0602 470676.
Nottingham. Telstar, 280 Huntingdon Street. Tel: 0602 505585.
Worksop. Computer Graphix, 32 Bridge Street. Tel: 0909 472248.

NORTHAMPTONSHIRE

Kettering. Boots, 35 Gold Street. Tel: 0536 514675.
Northampton. Boots, 9 The Parade. Tel: 0604 22573

NORTHUMBERLAND

Morpeth. Telerents (Northern) Ltd, 31 New Gate Street. Tel: 0607 513537.

OXFORDSHIRE

Abingdon. Ivor Fields Computers, 21 Stert Street, Tel: 0235 21207.
Banbury. Computer Plus, 2 Church lane. Tel: 0295 55890.
Oxford. Science Studio, 7 Little, Clarenden Street. Tel: 0865 54022.
Oxford. Absolute Sound and Video, 19 Old High Street, Headington, Tel: 0865 65661.

SCOTLAND

Aberdeen. Boots, 133-141 Union Street. Tel: 0224 585349.
Dundee. Boots, 49-53 High Street, Tel: 0382 21756.
Edinburgh. Boots, 101-103 Princes Street. Tel: 031-225 8331.
Edinburgh. Microworld Computer Group. 12 Leven Street. Tel: 031 228 1111
Edinburgh. Edinburgh Computers, 51-57 Lothian Road. Tel: 031 229 4418.
Edinburgh. Silicon Centre, 7 Antigua Street. Tel: 031 557 4546.
Glasgow. Boots, 200 Sauchiehall Street. Tel: 041 332 1925.
Glasgow. Microworld Computer Group, 11 Bath Street. Tel: 041 332 1116.
Glasgow. Boots, Union Street and Argyle Street. Tel: 041 248 7387.
Glasgow. Tom Dixon Cameras, 15-17 Queen Street. Tel: 041-204 0826.
Glasgow. Commscot Ltd, 30 Gordon Street. Tel: 041 226 4878.
East Kilbride. Boots, 33-37 The Plaza. Tel: 035 52 20629.
Falkirk. Boots, 79-91 High Street. Tel: 0324 20535.
Hamilton. Tom Dixon Cameras, 8 Cadzou Street. Tel: 0698 283193.
Peterhead. North East Computers. 1 Ellis Street. Tel: 0779 79900.

SHROPSHIRE

Shrewsbury. Computerama, 13 Castlegate. Tel: 0743 60528.
Telford. Computer Village, 2/3 Hazeldine House, Central Square. Tel: 0952 506771.
Telford. Telford Electronics, 38 Mall 4. Tel: 0952 504911.

SOMERSET

Taunton. Boots, 64-65 High Street. Tel: 0823 76061.

STAFFORDSHIRE

Newcastle-under-Lyme. Computer Cabin, 24 The Parade, Silverdale. Tel: 0782 636911.
Stoke on Trent. Town Computer Store, 30 Town Road, Hanley. Tel: 0782 287540.
Stoke on Trent. Boots, 3-5 Market Square, Hanley. Tel: 0782 23271.

SUFFOLK

Bury St. Edmunds. Boots, 11-13 Cornhill. Tel: 0284 701516.
Bury St. Edmunds. The Suffolk Computer Centre, 1-3 Garland Street. Tel: 0284 705503.
Ipswich. Computer Magic, 24 Crown Street. Tel: 0473 50965.

SURREY

South Croydon. Concise Computer Consultants. 1 Carlton Road. Tel: 01-681 6842.
Croydon. The Vision Store, 53-59 High Street. Tel: 01-686 6362.
Croydon. Boots, The Mall, 12-18 Whitgift Centre. Tel: 01-688 6021.
Epsom. The Micro Workshop, 12 Station Approach. Tel: 0372 721533.
Guildford. Guildford Computer Centre, 5 The Quadrant, Bridge Street. Tel: 0483 578848.
Wallington. Surrey Micro Systems, 53 Woodcote Road. Tel: 01-647 5636.
Woking. Harpers, 71-73 Commercial Way. Tel: 0486 225657.

SUSSEX

Brighton. Boots, 129 North Street. Tel: 0273 27088.
Brighton. Gamer, 71 East Street. Tel: 0273 728681.
Bognor Regis. Bits & Bytes, High Street. Tel: 0243 867143.
Eastbourne. Boots, 15 Eastbourne Arndale Centre. Tel: 0323 27742.
Horsham. Boots, 1 Swan Walk, Tel: 0403 53053.
Horsham. Orchard Computer Centre, 34 East Street. Tel: 0403 64884.
Worthing. Boots, 48-52 Montague Street. Tel: 0903 207106.

TYNE & WEAR

Newcastle-upon-Tyne. Boots, Eldon Square. Tel: 0632 329844.
Newcastle-upon-Tyne. RE Computing, Parkview House, Front Street, 4 Lane Ends. Tel: 091 2701740.
Sunderland. Business Micro Communications Ltd, Refuge Assurance Buildings, Saint Thomas Street, West Sunniside. Tel: 0783 654916.

WALES

Aberdare. Inkey Computer Services, 70 Mill Street, The Square, Trecynon. Tel: 0685 881828.
Aberystwyth. Aberdata at Galloways, 23 Pier Street. Tel: 0970 615522.
Cardiff. Boots, 36 Queens Street & 105 Frederick Street. Tel: 0222 31291.
Cardiff. The Computer Shop, 41 The Hayes. Tel: 0222 26666.
Cardiff. Cardiff Microcomputers, 46 Charles Street. Tel: 0222 373072.
Newport. Gwent Computers, 92 Chepstow Road. Tel: 0633 841760.
Newport. Boots, 155-156 Commercial Street. Tel: 0633 51212.
Swansea. Boots, 17 St. Marys Arcade, The Quadrant Shopping Centre. Tel: 0792 43461.
Swansea. The Micro Store, 35-36 Singleton Street. Tel: 0792 46980.

WARWICKSHIRE

Coventry. Boots, 38-42 Corporation Street. Tel: 0203 26561.
Leamington Spa. Boots, 31 Parade. Tel: 0926 24945.
Leamington Spa. Leamington Hobby Centre 121 Regent Street. Tel: 0926 29211.
Nuneaton. Micro City, 1a Queens Road. Tel: 0203 382049.
Rugby. O.E.M., 9-11 Regent Street. Tel: 0788 70522.

WEST MIDLANDS

Birmingham. Boots, City Centre House, 16-17 New Street. Tel: 021-643 7582.
Dudley. Central Computers, 35 Churchill Precinct. Tel: 0384 238169.
Stourbridge. Walters Computer Systems. 12 Hagley Road. Tel: 0384 370811.
Walsall. New Horizon, 1 Goodall Street. Tel: 0922 24821.

WILTSHIRE

Trowbridge. West Wiltshire Micros, Whiteheart Yard. Tel: 02214 67259.

YORKSHIRE

Bradford. Boots, 11 Darley Street. Tel: 0274 390891.
Doncaster. Boots, 13-15 French Gate, Tel: 0302 62238.
Barnsley. Boots, 34-40 Cheapside. Tel: 0226 82616.
Huddersfield. Micro World Computers, 1006-1010 Manchester Road, Linthwaite. Tel: 0484 846117.
Huddersfield. Boots, 22 King Street. Tel: 0484 21756.
Leeds. Boots, 19 Albion Arcade, Bond Street Centre. Tel: 0532 33551.
Leeds. Micro Power, Northwood House, North Street. Tel: 0532 458800.
Sheffield. PIP Micro Communications, 9 Taptown Crescent, Broomhill. Tel: 0742 661096.
Sheffield. Boots, 4-6 High Street. Tel: 0742 78333.
Wakefield. Boots, 26-28 Upper Kirkgate. Tel: 0924 376181.
York. York Computer Centre, 7 Stonegate Arcade. Tel: 0904 641862.

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JUKI: RS232 Interface £65 (c);   Spare Daisy Wheel £14 (d);
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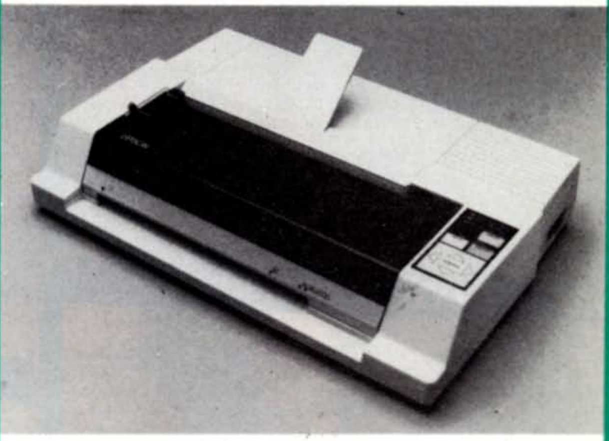

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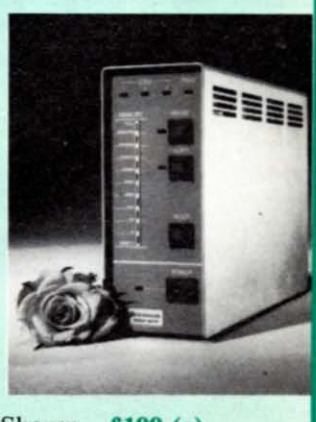

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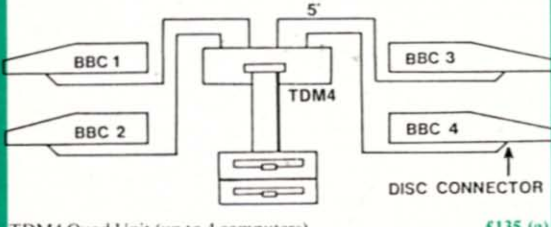
Monochrome £3.50 (d)

TOUCHTEC-501

Designed for use with Microvitec metal cased monitors, and using the RS-423 socket, this unit brings genuine touch-screen operation to your BBC. Ideal for the educational market. Supplied with a users handbook and utilities disc containing starter programs and development software. £260 (b)

DISC DRIVE MULTIPLEXER

The cost-effective alternative to networking! A self-contained unit that enables up to four computers to be connected to one single or dual disc drive. No hardware modifications — simply plugs into the computers disc interface connectors. No ROMs or other software needed. All DFS commands work as normal. The switching of drives between computers is totally automatic and completely invisible to the user. This unit is ideal for installing in classrooms and other situations, where networking is not planned or necessary, or where costs must be kept low. In many cases software needs to be shared, although full networking complexity and cost is not needed. Several of these units can be connected in series to allow more computers to access the same discs, i.e. two quads connected to one dual will allow 7 computers to share 1 drive. Units are supplied with 5' of cable per outlet as standard. Mains powered.



TDM4 Quad Unit (up to 4 computers)	£135 (a)
TDM2 Dual Unit (2 computers)	£75 (b)

DISC ACCESSORIES

Single Disc Cable £6 (d) Dual Disc Cable £8.50 (d)
10 Disc Library Case £1.80 (d) 30 Disc Case £6.00 (c)
Lockable Storage Boxes 40 Discs £14 (c) 100 Discs £16 (c)

DISC DRIVES

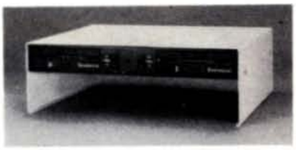
TECHNOMATIC drives are fitted with high quality slimline Mitsubishi mechanisms and represent the state of the art in drive technology. The drives are built to the highest standards and are tested to their full performance capability before packaging.

Single drives are available with or without integral mains power supply. The dual drive power supplies are switch mode type and are generously rated to ensure minimum heat generation even over long periods of operation. All drives with integral power supply are fitted with a mains indicator.

The drives are housed in attractively designed metal casings painted in hard wearing BBC matching paint. The dual drives can be supplied in stacked version or with built-in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer installation.

The 80T drives are supplied with the 40/80 track switching modules at no extra charge. The 40/80 track switches are conveniently positioned in the front on dual drives to enable easy switching between the tracks.

All drives are supplied with all the necessary cables, manual and a formatting disc. The mains powered drives are also fitted with a 13A mains plug suitably fused. The drives are ready to be fitted to the computer. All drives are capable of operating in single or double density modes.



Single Drives:			**With integral psu:**	
1 × 100K 40T SS	: TS100	£85(b)	PS100	£120 (b)
1 × 400K 80/40T DS	: TS400	£125 (b)	PS400	£145 (b)

Dual Drives: (with integral psu)

Stacked Versions:		Plinth Versions:	
PD200 2 × 100K 40T SS	£190 (a)	PD200P	£215 (a)
PD800 2 × 400K 80/40T DS	£265 (a)	PD800P	£289 (a)

Note: We can supply drives with Shugart mechanisms at considerably lower prices. Please phone for details.

3.5" Drives:
These compact drives, used with most of the new 16 bit micros offer fast access times and high performance with minimum of power consumption. The mechanisms are 80 track double sided and are capable of both single and double density operation. The single drive is offered in a dual case with a blanking plate for future upgrading. The drives come complete with cables, manual and formatting disc.

TS35 1 × 400K 80T DS £99 (b) TD35 2 × 400K 80T DS £175 (b)

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD **£13(c)**	40T DSDD **£18(c)**
80T SSDD **£22(c)**	80T DSDD **£24(c)**

3½" discs. Pack of ten £38(c)

DRIVEHEAD CLEANING KIT

The FLOPPICLENE drive head cleaning kit is an ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminates the risk of contamination and abrasion of sensitive driveheads. These risks are normally inherent in the reusable drivehead cleaning kits. Floppiclene with 20 disposable cleaning kits. £14.50 (b)

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London NW10 1ED
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London W2
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(c) £1.50
(d) £1.00.

COMMUNICATIONS

MODEMS

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered **£62 (c)** BBC Lead **£6** External PSU **£9 (c)**

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21, V23, (BELL 103/113/108 outside the UK) and including 75,300,600, 1200 Baud ratings. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto/dial/auto-answer makes this modem unique. WS2000 **£129 (c)** BBC Serial Cable **£7.**

Free Micro-Link registration and free Micronet quarterly.

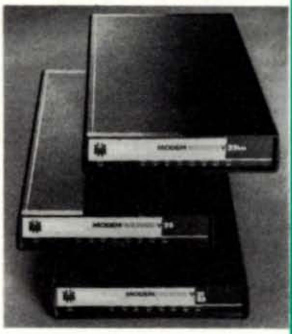
WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line **£30 (d).**
BBC User Port cable (for modem control) **£7.**

SKI KIT (Allowing total control of the modem by your computer) **£10.**

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers and protocols or autodialling **£10.**

WS2000 Auto-Answer Card £30(d).
(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DATA-BEEB An advanced communication ROM from Miracle Technology. Its many features include both Viewdata (Prestel) and Terminal modes, Auto-Answer and Auto-dial for fully expanded WS 2000's etc. Macro facilities allow flexible use of its many facilities e.g. automatic dialling, log-on, going to a specific page, printing it, and going off-line, all in one operation. **£25 (d)**



NEW WS3000 SERIES A new range of microprocessor based modems, offering speeds of up to 2400 baud full duplex. Features include: 'Hayes' protocol compatability, Auto-Answer, Auto-Dial, speed buffering, printer port, data security option, etc.

WS3000 V2123 (V21 & V23) **£295 (a)**

WS3000 V22 (as above plus 1200 baud full duplex) **£495 (a)**

WS3000 V22bis2400 (as above plus 2400 baud full duplex) **£650 (a)**

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. Any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time clock. **£27 (d)**

TERM-II A good general purpose communications package for bulletin boards, electronic mail etc. (Not for PRESTEL) **£26 (d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£57 (d)**

REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. **£29 (c)**

time-word
real-time clock
TECHNOMATIC

EPROMER II

EPROMER II
TECHNOMATIC LTD.

A sophisticated eprom programmer that handles the full range of popular single rail eproms (incl 27256) and allows the user full control of the programming process.
Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered.
- Clear and simple instructions displayed on the screen make the programming easy for both the first time user and the advanced user.
- Eproms upto 16K (27128) programmed in single pass.
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses with FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.
- Checksum facility allows for easy identification of programmed roms.

EPROMER II with Manual & Cassette **£99 (b)** Software on disc **£3**
ROM based software **£10**

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. **£59 (b)**

UV1B as above but without the timer. **£47 (b)**

ROM/RAM EXPANSION SYSTEMS

COMPUTER VILLAGE ROM/RAM BOARD: A beautifully designed expansion board, simply plugs in — no soldering. (Fits into 6502 and Video ULA Skt.). Fully buffered with 16 paged Rom capacity. Option of 16K paged Ram, with software initiated write protect — battery backup is included. It allows nine different ROM/RAM configurations. **£43 (c)**

ATPL SIDEWISE ROM EXPANSION BOARD A well constructed expansion board, simple to instal and requires no soldering. All buses are buffered. It allows full sideways rom expansion to 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K CMOS RAM. Battery backup option allows data retention in the RAM when the computer is switched off. Several link selectable options including write protect for the RAM. ATPL Board **£39 (d)** Battery Backup Kit **£18 (d).**

RAMROM-15 The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. **£86 (b)**

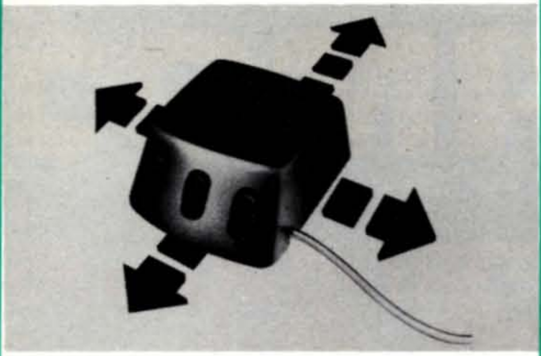
ARIES B-12 Board £40 (d) **ARIES B-20 Board £78 (d)**

RB2 TRACKER BALL

A precision built tracker ball. Software allows RB2 to function, instead of cursor keys, for word processing, CAD/CAM etc. Software includes a graphics/CAD package.

RB-2 (with 'microdraw').	£52 (b)
RB-21 (with 'icon artmaster').	£60 (b)

AMX MOUSE



This sophisticated mouse has many advanced features such as Icons, Windows etc. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £69 (b)

AMX DESK An organisational program, including memo-pad, telephone/address book, diary, alarm, calculator etc. On Disc. £22 (d)

AMX PAINTBOX £13 (d)

AMX UTILITIES Provides new drawing facilities including Zoom, colour sketch and more. On Disc. £13 (d)

ACORN TELETEXT ADAPTOR £192 (a)

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282 (a)

DATABASE MANAGMENT SYSTEMS

GEMINI DATAGEM features include * almost unlimited file size (max 10Mbyte) * supports up to 4 drives * Max of 5000 records per file * max 6K record size * max of 62 fields * generates form letters from records.
Please ask for leaflet. £68 (c)

VIEWSTORE An exciting, powerful database with many features: Display can be 'spreadsheet' or 'card-layout' type. Powerful selection and sorting utilities. Any screen mode can be used. Data can be sent to View and ViewSheet. Maximum file size 4096MByte! Maximum record size 60K. £52 (d)

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £69 (d)

CLARES BETABASE £18 (d)

MASTERFILE II The new version of the popular general purpose file management system. It allows large amounts of information to be stored and processed. It is extremely powerful yet flexible to use. The disc version allows up to 17 fields per record, and the only limitation as to the number of records is the capacity of the disc. Typically, using 5 fields, about 2000 records may be stored on a 100K disc. This latest version features many new facilities including use with WORDWISE/VIEW **£16.50 (d)** Disc (80 or 40T).

CP/M SOFTWARE FOR TORCH Z80 ACORN Z80 PROCESSOR

We can now supply almost any CP/M based software package in a format suitable for the Torch Z80 and Acorn Z80 second processors.

WORDSTAR PROFESSIONAL The advanced word processing package comprising of WordStar, MailMerge, StarIndex and SpellStar, a total combination offering substantial savings on individual prices. WordStar is the best selling word processing program on the market. Extensive operator aids include a comprehensive yet friendly manual, step-by-step training guide, command cards, on-screen menus with four levels of help messages etc. etc. SpellStar checks text files against its 20,000 word-plus dictionary. You can both add to the dictionary and create specific supplementary ones. Mailmerge is ideal for mailing applications where lists are selected on a range of criteria. It enables the fast production of personalised form letters, mailing labels, invoices, etc. StarIndex creates alphabetical indexes, tables of contents, paragraph numbering and much more.

WORDSTAR PROFESSIONAL £310 (a)

WORDSTAR £275 (a) MAILMERGE £145 (a)

DBASE-II Undoubtedly 'The Database', can be used for an almost limitless number of business applications, ranging from mailing list preparation and maintenance through to running accounting ledgers and payrolls. In addition to standard database features it provides much more. An on-disc tutorial takes you from setting up a simple file all the way through to setting up custom screens and reports. Automatic calculations may be performed on data, and fields or entire databases may be modified or replaced with single, English-like basic commands; Dbase-II can therefore be used by general personnel having no programming knowledge. It can be tailored to suit a variety of professions and individual needs, with files such as accounting, payroll, time billing, job costing, scheduling and mailing lists. It can access several files at a time. It is fast, flexible and powerful. £335 (a)

SuperCalc-2 A powerful decision making tool which helps to solve complex 'What if...' financial modelling and forecasting questions. With a working area of 63 columns and 255 rows, Supercalc 2 takes full advantage of colour and full memory. It allows consideration of different spreadsheet files, sorting, a wide choice of formats. Full documentation with easy to follow lessons and single key commands make the use of Supercalc2 very easy. Separate windows provide for display of results and formulae simultaneously. Calendar and date calculations simplify calculations on loan repayment and periods. £180 (a)

Pro-Pascal A full implementation of the International Standard for Pascal (ISO 7185) apart from the optional conformant parameters feature. In addition to the standard features of Pascal, Pro Pascal includes: dynamic strings for character and string manipulation, 9 digit integers and random access file handling for data processing applications, single and double precision floating point arithmetic, an assembler level interface for systems programmers, and separate compilation of program segments for building libraries of commonly used procedures and enabling very large object programs to be constructed. Pro Pascal is a 3 pass compiler, converting a source program into efficient Z80 machine code. The package includes a compiler, run-time library, link editor, library manager and cross referencing utility. £220 (a)

BSTAM A telecommunication facility used for transmitting any size CP/M file. £165 (b)

Other packages available include CIS-COBOL, INFOSTAR, DMS +, FMS, SAGE, ATITUTORIALS, MACRO-80 etc. Please telephone with your requirements.

TORCH GRADUATE IBM SOFTWARE

We are able to supply most popular software packages including: FRAMEWORK, WORDSTAR, WORD, EASY-WRITER, DBase-II & III, LOTUS-123, VISICALC, SAGE etc. Please telephone with your requirements.

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(a) £8 (Datapost)
(b) £2.50
(c) £1.50
(d) £1.00.

ROMs/SOFTWARE

WORD-PROCESSORS

VIEW Acorn's version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. £48 (c)

VIEW VERSION VS.O Also compatible with BBC +. Complete with Printer Driver Generator.

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52 (c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £13 (d)

WORDWISE One of the most popular word processors for general use. £34 (d)

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. £49 (d)

SPELLCHECK-I £15 (d)

SPELLCHECK II A ROM based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17,000 words on 100K drive. Fully compatible with 6502 second processor. £24.50 (d)

SPREADSHEETS

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £48 (d)

ULTRACALC 2 This enhanced version of the original BBC Publications popular spreadsheet ROM includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normally found in well designed spreadsheets. £55 (d)

INTERSHEET The new spreadsheet from Computer Concepts. Many advanced facilities including 105 character display, several spreadsheets may be used at once, may be used with View & Wordwise etc. etc. £49 (c)

INTERCHART Graphics Package. £38 (d)

LANGUAGES

NEW **META-ASSEMBLER.** Editor/Assembler, Macros etc includes 65xx, 68xx, 8048, 8086, Z80, 68000, Z8000, 8086-8088 etc. Phone for details. ROM and Disc £69 (d)

6502 DEVELOPMENT PACKAGE A Macro-Assembler with utilities for use with the 6402 2nd Processor. Enables the serious programmer to develop large programs in assembly language. £43.35 (d)

ISO-PASCAL Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £60 (c)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £60 (b)

BCPL A full implementation of the BCPL compiler language consisting of the language of ROM, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. £52 (b)

BCPL CALCULATIONS PACKAGE Supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calcultion files, example files and a comprehensive user guide. £17.30 (b)

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL ROM to be converted so that they can be run on any BBC micro whether it has a BCPL ROM or not. Stand alone programs for other 6502 based systems can also be developed. £43 (d)

ACORN LISP Rom £43 (d); **FORTH** £43 (d); **COMAL** £43 (d)

MICROTEXT The authorising system from the National Physical Laboratory. **Disc** £53 (b) **Cassette** £43 (b)

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM. £41 (d)

OXFORD PASCAL A fast, compact P-Code compiler, that fully utilises BBC Graphics and sound, contains a powerful editor, and produces 'standalone' software. £43 (c)

UTILITIES

ACCELERATOR From Computer Concepts — Finally, a comprehensive compiler that will compile existing BBC Basic programs, simply, and in most cases, without alteration. Compiles to either intermediate code or machine code. Supplied with two Roms, manual, utility disc etc. £56 (d)

SPEECH ROM From Computer Concepts — allows infinite speech with the Acorn speech system using simple * commands. Pitch and emphasis can be altered — even singing is possible! £29 (c)

DISC DOCTOR Computer Concept's popular disc utility ROM which adds 20 commands to the DFS system. £26 (d)

GRAPHICS ROM £24 (d)

PRINTMASTER The ROM that features the most versatile screen dumps for the Epson MX/RX/FX80 and KAGA PRINTERS. Includes mode 7, magnification, character definition, enlarged text, etc. — in short — this ROM does it all! £27 (d)

BROM The new utility ROM from Clares — a Toolkit ROM that gives you full screen editing. Many extra functions are included. £29 (d)

REPLICA II 40 & 80 Track Versions available. £9.75 (d)

EXMON-II Advanced M/C Monitor. £22 (d)

TOOLKIT Adds 27 new commands to BBC Basic. £21 (d)

SLEUTH Basic Debugger £21 (d)

HELP ROM based comprehensive on screen HELP facility to aid and speed up programming. £19 (d)

DUMPMASTER Disc based dumps for many printers. £9 (d)

HERSEY CHARACTER Font generator £11.00 (d)

BILLBOARD A useful program that enables your BBC to produce superlarge 'Billboard' type characters i.e. a continuous horizontal scrolling of super-large characters. £15 (d)

DISCMASTER Disc Utility. £15 (d)

BEEBUG SUPERPLOT Cass £7.50 (d) **BEEBUG DESIGN** £15 (d)

MUROM Music Development ROM. £21 (d)

MICROGUIDE Keyboard Key-Plate. £6.00 (d)

When ordering software on disc please specify track format (40/80)

BOOKS

(No VAT, p&p £1.50 per book)

CPU/Assembly Language Books

6502 Applications	£12.50
6502 Assy Lang Prog	£19.95
6502 M/C for Beginners	£ 5.95
6502 Advanced Programming	£11.95
6502 Programming	£13.95
6809 Assy Lang Programming	£13.45
6809 Programming	£12.95
8086 Book	£23.95
Prog. the 8086/89	£14.95
Programming the 6800	£19.95
Programming the Z80	£16.95
Z80 Ass./Lang Prog	£19.95
8087 Applications and Programming (IBM) PC	£22.25

LANGUAGES

BBC Micro Sideways Roms Rays	£ 9.95
CP/M Handbook	£13.95
Mastering the CP/M	£16.50
FORTRAN Cookbook	£ 8.00
Introduction to PASCAL	£16.50
Prog the Micro with PASCAL	£ 8.50
The UNIX Book	£12.50

BBC Micro Books

Books for Beginners:

BASIC programming on the BBC — Cryer	£ 5.00
BBC BASIC	£ 4.00
BBC BASIC for Beginners	£ 4.00
BBC Micro for Beginners	£ 4.75
Century Computer Prog	£ 9.95
Drawing Your Own BBC Programs	£ 6.95
Easy Prog for the BBC Micro	£ 5.00
Friendly Computer Book	£ 3.50
Gateway to Computing BBC1	£ 4.95
Gateway to Computing BBC2	£ 4.95
Introducing the BBC Micro	£ 4.50
Mathematical Programs in BBC Basic	£ 7.95

Languages/Programming

30 Hours BASIC	£ 6.95
Advanced User Guide	£12.50
Adv BASIC Rom User Guide	£ 7.50
Advanced Prog Tech for BBC	£ 8.95
Applied Ass./Lang on the BBC	£ 7.95
Ass./Lang Made Easy for BBC	£ 5.95
Assy. Lang. Prog. made easy	£ 5.95
Applied Assembly Lang on BBC	£ 7.95
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Applied Ass./Lang on the BBC	£ 9.95
BBC Micro Advanced Programming	£ 9.95
BBC Micro Sideways ROM's RAM's	£ 9.95
BCPL User Manual Acorn	£15.00
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FORTH Acorn	£ 7.50
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LISP Acorn	£ 7.50
Programming the BBC	£ 6.50
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S-PASCAL Acorn	£ 7.50
Using BBC BASIC	£10.00
Word Processing on BBC (Wordwise + Epson)	£ 5.25

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Advanced Graphics with BBC	£ 6.00
BBC Graphics & Sound	£ 7.50
BBC Micro BASIC, Sound & Graphics	£ 7.50
Creative Sound on the BBC	£ 9.95
Graphics on the BBC Micro	£ 6.00
Turtle Graphics	£ 7.50

EDUCATIONAL

BBC Micro in Education	£ 6.50
Prog for Education (Pri.Sch)	£ 5.95

DISC DRIVE SYSTEMS

Advanced Disc User Guide	£14.95
BBC Micro Disc Companion	£ 7.95
Disc-Drive Projects for Micro's	£ 5.95
Disc Book	£ 3.50
Disc Programming Techniques	£ 7.95
Disc Systems	£ 6.95
Using Floppy Discs	£ 6.95

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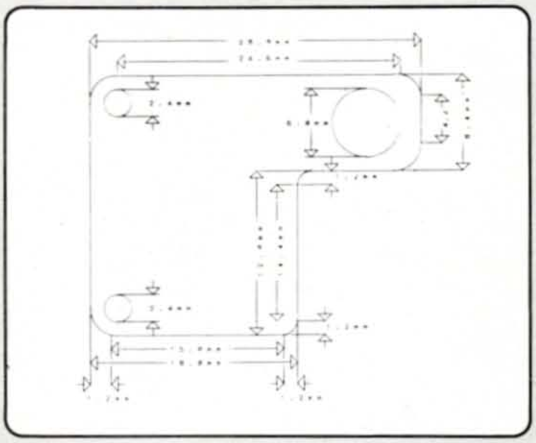
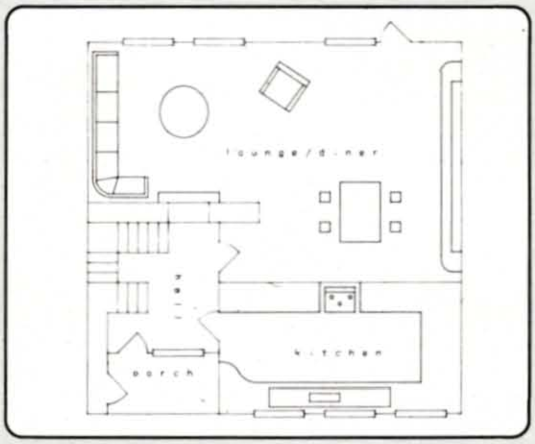
NOVACAD

Computer Aided Draughting for the BBC Micro





A sophisticated CAD package with unique facilities which until now were confined to custom built CAD packages.

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- Very user friendly with all commands and controls from the keyboard. Special windowing techniques make available to the user almost one million dots allowing a lot more detail to be put on the drawing than one would normally expect the BBC to be capable of. (Mode 0 screen display only 1 6 the number of dots). The drawing can be 4 windows across and 5 up.
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- ICONS can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned. COPY facility speeds up the drawing if particular shapes are repeatedly used.
- The zoom facility allows the user to magnify any section of a drawing by upto 20 times to make it easier to insert details.
- User definable grid helps the user set his own scaling for the drawings.
- Horizontal and vertical displacements can be measured in any user defined scale.
- Up to 8 'levels' can be used to produce multi layer drawings, and then user can decide which levels are to be displayed. This can be particularly useful in pcb drawings, architectural drawings with details of the services behind the walls displayed only when required and many other such applications.
- Text can be added at any position vertically or horizontally.
- Use of 2nd processor will allow use of colour, higher pixel density drawings and considerably faster operation. (NOVACAD without the 2nd processor is faster than any other CAD package we have seen for the BBC).
- Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.
- Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.
- An optional plotter utility will allow output to a range of popular plotters for high quality diagrams.

NOVACAD will prove to be an invaluable teaching aid in technical schools and colleges and for anyone involved in draughting it will be an ideal labour saving tool.

NOVACAD package with 16K ROM, Utility disc and a comprehensive manual £79(c).

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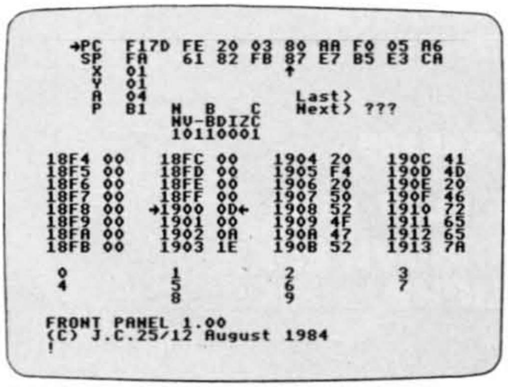
Competent job but no star rating

JIM NOTMAN investigates a new machine code monitor and looks at an innovative screen handler ROM

Panel v1.00
Resource Facilities



```
→PC  F17D FE 20 03 80 AA F0 05 A6
 SP  FA      61 82 FB 87 E7 B5 E3 CA
  X  01               ↑
  Y  01
  A  04               Last>
  P  B1    N  B   C   Next> ???
           NV-BDIZC
           10110001

18F4 00    18FC 00    1904 20    190C 41
18F5 00    18FD 00    1905 F4    190D 4D
18F6 00    18FE 00    1906 20    190E 20
18F7 00    18FF 00    1907 50    190F 46
18F8 00   →1900 0D←   1908 52    1910 72
18F9 00    1901 00    1909 4F    1911 65
18FA 00    1902 0A    190A 47    1912 65
18FB 00    1903 1E    190B 52    1913 7A

 0          1          2          3
 4          5          6          7
            8          9

FRONT PANEL 1.00
(C) J.C.25/12 August 1984
!
```

Figure I: Panel's initial display

A QUICK look through the adverts in the popular BBC magazines recently showed some 14 different machine code monitors available on ROM. You would expect that any firm which enters this market must have a product which either has some unique features or is better than all of its competitors.

Panel is supplied on an 8k eprom, for insertion into a vacant paged ROM socket. On typing *PANEL the "front panel" of the monitor is entered – see Figure I.

A number of items of information, including the contents of the registers and processor flags and part of the stack pointed to by the stack pointer are given.

Most of the central area is not used as effectively as possible.

Perhaps a more traditional memory dump with Ascii equivalents would display a larger section of memory without being less easy to use.

Considerable effort has been made to arrange for the commands to be by single key stroke, for quick and easy input. However, as you can see from the list of commands – Figure II – you soon run out of easily-remembered letters, ending up with rather awkward letter associations and a number of other symbols, not the easiest set of commands to learn.

This awkwardness extends beyond the commands. For example, if you want to change the value of the X register, the , or . key must be pressed

COMMAND SUMMARY

!	Set a breakpoint.
"	Write Ascii character to memory.
#	Select ROM number.
$	List area of memory as Ascii characters.
%	Set internal status register.
&	Following number is hexadecimal.
'	Change response to BRK (toggle).
(	Set trace limits.
)	Convert radix.
*	Enter OS command.
+	Add correction value on to memory.
,	Move memory pointer up one line.
–	Move memory pointer back a byte.
.	Modify register/Move register pointer.
/	Move memory pointer back 8 bytes.
0-9 A-F	Hexadecimal digits.
:	Following number is binary.
;	Input Correction value.
“	Change screen mode.
?	List breakpoints.
@	Return to Basic.
G	Memory search.
H	Hexadecimal calculator.
I	Move to 16-bit address pointed to by memory pointer.
J	Jump to execution address.
K	Continue from program counter value.
L	Disassemble area of memory.
M	Set memory pointer at given address.
N	Find next occurrence of search string.
O	Set printer options.
P	Fill and test memory.
Q	Trace execute program.
R	Move to address pointed to by memory pointer.
S	Block shift.
T	Input text string.
U	Set memory pointer to program counter.
V	Set program counter to memory pointer.
W	Continue from program counter value + 1.
X	Intelligent block shift.
Z	Single step.
_	Move memory pointer on 8 bytes.
¦	Following number is decimal.
}	User command.
~	Toggles display Hex/Ascii.

Figure II

until the register pointer reaches the X, then a value entered, not forgetting to press . to update the register.

Most of the functions expected of a monitor are here, from block manipulation commands to single stepping, and a disassembler – though this would not look at itself.

Up to eight breakpoints can be set. Each one can have a number of conditions, making it very flexible.

An interesting idea is that instead of using variables – as in Basic – a number of locations, which it calls tracking variables, can be assigned a value, which is recalled at any time by pressing the Ctrl key and a function key. This is a handy way of storing frequently used values.

Panel also has some star commands. These are:

***CK** After this, Panel is entered on typing Ctrl + F.

***NCF** Turns above option off.

***BRK** After this command, Panel will be entered on a 6502 BRK, as happens when errors messages are handled.

***NBRK** Turns off the above option.

***STOG** Acts as a toggle so that when Panel is entered only registers are displayed on the bottom line. This is supposed to help in debugging graphics screens, but to do this reasonably you really need a monitor with dual screen facility such as Aid, or Exmon 2.

The documentation supplied for review was a 14-page closely-packed printout. It was not the clearest or the most easily read I have seen.

In conclusion, Panel is a competent machine code monitor with good range of commands, but it rather lacks "star" quality.

Screen Handler helps solve database editing problems

Screen Handler ROM
Microsolve

DESIGNING screens for inputting information into databases seems to be a perennial problem. The trouble is that the INPUT statement in Basic is not very flexible. It is of little use in editing any information already entered or of editing the string being entered.

If for example you had typed in a long name and then discovered that you had missed out the first letter, you have to delete what you have typed and start again.

It will also be necessary to limit the length of a string as it is being typed in – very few need all of the available 254 characters. This is not something that can be done directly with an INPUT.

This screen handler ROM is an attempt to get round these problems.

No need to learn a large number of new commands. Simply *SCR followed by a number between 1 and 5.

To see how this chip works, we'll need to start with *SCR1. This enters a simple editor for designing input pages. Any of the screen modes will do.

The cursor can be moved to any position on the screen with the cursor control keys and any text typed in where you want it.

Areas or "fields" where information is to be typed in need to be indicated by the ∸ key (↑in Mode 7), one for each character. Fields can also be designated for display. Where data can be displayed but not input is shown by~(÷ in Mode 7).

After designing the page, the page data is saved to the current filing system. Only the relevant data is saved, so that you won't have to worry about it taking up too much memory space.

In a program this screen "map" will need to be loaded into memory, with zero page locations &72 and &71 pointing to it. *SCR2 will then place the text of the screen map on to the screen.

Similarly *SCR3 placed data in the data buffer (&73 and &74) on to the screen in the correct data "slots".

*SCR4 allows data entry into the "enterable" fields. Any mistakes made can simply be overtyped, though there seems to be no facility for insertion or deletion of characters within a string.

As well as placing characters on the screen, it places them in the data buffer. This data buffer is treated as one continuous area which directly mirrors all the individual fields on the screen.

*SCR5 allows individual fields to be highlighted in Modes 0 to 6. This will prove useful with routines that you write to verify data, with any fields containing incorrect data being made to stand out from the others.

The instructions consist of eight A4 pages. They cover simple use and contain a short demonstration program. However, I feel that further examples of a tutorial nature are necessary as the ideas required for this ROM will be new to many of the possible users.

One niggle. The *HELP will only display the presence of paged ROMs up to and including this ROM, but not any in lower priority sockets.

Routines similar to those implemented here, could be written in Basic, but would require many more lines of code and probably slow down the program.

I liked the idea, but think that it should be extended so that different types of input field could be designated, such as numeric only fields and date fields with their own inbuilt error checking and warnings.

On the right track for graphics control

Marconi
RB2

By TERRY HALLARD

TRACKBALL devices are an alternative form of input which, like the mouse and joysticks, take control of the cursor.

In earlier graphics-dedicated mainframe machines, the cursor keys were replaced by two thumbwheels at right angles to each other, but this was found to be too slow for military purposes.

This was especially true for Air Traffic Control and radar tracking, and so the trackball was developed. Now Marconi has brought out for the BBC Micro the RB2, a simplified version of their military device.

By replacing the X-Y cursor keys, trackballs provide smooth diagonal transitions rather than "stepping up and sideways" by small stages. As the ball moves, it rotates two spindles, at right angles to each other. These have perforated discs at their ends through which a light shines on to an optical encoder. Any movement is sent as a stream of pulses providing X and Y directional information.

This is a very neat tool, cream-coloured with brown buttons and fingerball. It is about the size of a thick paperback book, angled towards the user, with rubber feet to prevent slip.

It fits the hand nicely with a textured area for the palm, the ball lies under the fingers, and the three buttons are within easy reach at the far end. These buttons can be dedicated to any purpose the programmer has in mind.

The ball spins easily and is the size of a large snooker ball. The device connects via a cable into the User Port underneath, and comes with its own software on cassette packaged in with it.

In action the trackball performs very much like its other two rivals, the mouse and the joystick. But Marconi claims, with some justification, that its product is more stable and accurate than either.

Unlike the mouse, which needs a large-ish uncluttered area of desk space to move around on, Marconi proudly claims that the RB2 has a minimal footprint (this year's buzzword). This is quite true – on my desk any space is at a premium and the RB2 nestles neatly between the BBC Micro and the disc drives. One-hand operation is easy, leaving the other to peck at the keyboard.

It can also be easily held in the hand and operated, which of course is the best way to use joysticks. But, unlike many joysticks, with trackball the cursor can be moved quickly to a point on the screen and left there without drifting.

So the technique is to spin rapidly to the near location and then to "fine tune" into the exact desired position. This is the prime advantage of this device.

Where many joystick drawing programs employ a key press to "change gear", altering movement from quick to medium to slow, the trackball can vary speed continuously. Cursor control is smooth and easy, about the same as a good joystick, but on balance however, I feel that the mouse has a more natural drawing action than either of these.

The software comes with three possible configurations for the trackball. it can be used as an extension of the keyboard for editing Basic programs or for word processing – this is where the buttons come in very useful.

The three buttons are initialised as Return, Copy and Delete, but the user can redefine them as any key or even use them in the manner of function keys, storing a little routine there.

Using Wordwise, I like to configure them as Delete, "Place Markers" and "Copy Marked Text". This is more convenient than just "Move Marked Text" – the markers stay round the original phrase or sentence, so you can leave it where it is, at the same time experimenting with it in several locations until happy. Finally you can delete the original – all without continually replacing markers.

The trackball can also be made to mimic a joystick, taking over control in those programs written already for them.

Finally there is the direct trackball configuration for dedicated software. This creates a machine code patch which interprets its particular movement codes. This can be slotted into memory at any one of four listed addresses – or the user can select any other address that they wish.

You can save this routine for later use, incorporating it in your own programs, or the computer can continue directly, with it in place, loading and running the required program. Further details of this are contained in the user manual I think, but I did not get one with the package.

The enclosed program is pretty good, though, and is quite self-explanatory. Also in the accompanying software is the standard simple painting program.

Microdraw also do one or two other packages for the RB2, which double up as programs for the British Micro Graphpad. There is another drawing one which has a sprite definition routine and there is the Ibbotson DDX package, a specialised draughting program for small building and architectural firms. It contains some excellent hatching and rendering routines, auto-dimensioning, zoom facilities and quite a lot of very useful stuff – but costs a bit more than the average micro user can afford.

On the whole I think that this is a very useful device. It certainly would be an excellent accessory for any severely-handicapped micro enthusiast.

If pressed to place it in a "usefulness list" I would probably put it slightly above the best joystick but just under the mouse and the digitising tablet. Its strengths are the small desk area that it takes up, the simple one-handed operation and the lack of drift of the cursor on-screen.

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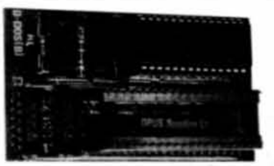

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● 1431 – Medium resolution as used on the BBC television computer programme	**£185**
● 1451 – High resolution, suitable for word processing in mode 0	**£229**
● 1441 – High res, exceeds the capabilities of the BBC micro	**£385**
● 1431AP RGB + PAL and AUDIO	**£199**
● 1451AP RGB + PAL and AUDIO	**£269**
● Dust Cover for Microvitecs	**£5.50**

All Microvitec Monitors are 14" and are supplied complete with cables.

KAGA

● KAGA KX1201G Hi-res Green Monitor	**£90**
● KAGA KX1202G Ultra-Hi-Res Green Monitor	**£105**
● KAGA KX1203A Ultra-Hi-Res Amber Monitor	**£105**
● KAGA Vision 2, Hi-Res, RGB Colour Monitor	**£225**
● KAGA Vision 3, Ultra Hi-Res, RGB Monitor	**£310**

FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen. Supplied complete with cables.

Introductory Offer: **£169**

ZENITH

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics **£66**

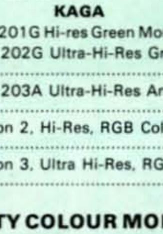
LEADS

BNC Lead for Zenith or Philips	**£3**
RGB lead for KAGA	**£3**

N.B. Carriage on Monitors **£7** (securicor)

NEW

ROM-SPELL



ROMSPELL is the new fast Spelling Checker ROM from Watford. Packed with excellent features, ROMSPELL is probably the most advanced spelling checker available for the BBC micro.

Features include:

- 30,000 word dictionary
- One pass check
- Two pass check
- Ambiguous word check
- Basic access to ROMSPELL
- Immediate entry check

ROMSPELL is fantastic value at **£23**

(Please specify 40 or 80 tracks when ordering)

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 400k Epson drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

NEW LOW PRICE

Only £999

CREDIT CARDS
24 HOUR HOT LINES
ACCESS 0923 50234
VISA 0923 33383

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book – No VAT)

This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£23**

(For software on disc please add £2)

ALFRED ROBOT SYSTEM

Designed specifically to teach the principles of Robotics, the Alfred Robot system is priced for the hobbiest pocket.

Alfred is controlled by your computer via the User Port (or similar port) and can be programmed to perform complex movements with 5 different axes of revolution.

A full circuit diagram and detailed fitting notes are supplied with Alfred.

Complete software packages are also available to utilise the potential of the Alfred Robot System.

Lifting capacity of 110gms. External requirements: 9v-12v 2 amp DC power supply.

Price £195

DATABASE MANAGEMENT SYSTEMS

DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £36

(Please specify 40T or 80T disc

DATAGEM
Gemini's 24K ROM based
DATABASE Management System
Special Offer: **£69**

Continued →

NEW LAUNCH

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *BT Approval applied for.*

Launch Price: Only **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

NEW LAUNCH

The Watford ROM/RAM CARD
A must for all serious users

We, at Watford Electronics, have been producing high quality hardware and software products for the BBC for three years now. Having carefully observed the needs of our customers we set our top hardware engineer the task of producing the ultimate ROM board to meet all your ROM/RAM requirements.

After weeks of top secret development we are now able to bring you more details of this, the ultimate in ROM/RAM boards.

● No overheating problems. ● No User Port corruption. ● Full buffering. ● NO SOLDERING. ● No flying leads. ● Firmly mounted. ● Easy fitting. ● Up to 8 banks of 16k of Dynamic RAM. ● One bank of 16k CMOS Static RAM allowed. ● All RAM has Write protect. ● All RAM has Read protect. ● CMOS RAM can have battery backup. ● Special RAM write register. ● Can run any BBC ROM. ● FREE utilities disc. ● Compatible with DDFS boards. ● Compatible with our 32k RAM Card. ● Compatible with our Sideways ZIF. ● Large printer buffer (up to 128k) ● High speed disc backup via RAM.

Obviously, so much RAM requires some powerful facilities to use. To show you just how powerful the features our board offers are, and to convince you that the competition if any, is just simply not worth buying, we shall provide some more details on the advanced features offered.

Each socket has write protection to allow all ROM based software to be run. Also, to help during software development, each socket is equipped with a special read protect facility (this allows recovery from ROM crashes).
Up to 8 ROMs and 8 banks (each of 16k) of RAM may be used, or one of the ROMs may be configured to give 16k of battery backed CMOS Static RAM.

The RAM socket selection (which is independent of the normal ROM socket) is performed by a special register at &FF30. In normal systems, a "write" to this location would have no effect. We believe that there is available an inferior board in which, for some totally unexplained reason, the User Port (as used by the AMX Mouse, Eprom Programmers, etc.) is used for the selection. Obviously this was not a very sensible move on the part of this manufacturer.

The ROM/RAM card from Watford represents second generation ROM board technology and is a must for all serious users of the BBC Micro.

Please write in for technical details and further prices.

INTRODUCTORY PRICES:

● ROM/RAM CARD with 32K Dynamic RAM	£45
● ROM/RAM CARD with 64K Dynamic RAM	£69
● ROM/RAM CARD with a massive 128K RAM	£109

OPTIONAL EXTRAS:

● 16K Plug-in STATIC RAM	£14
● Battery for Battery Backup on Static RAM	£2

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

**Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)
To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at only £65 and the Double Density Unit at £66.**

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.42 Yes	1.52 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for two years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade.

PRICES

● *Complete Disc Interface Kit incl. DFS ROM & fitting instructions*	**£65**
● *Acorn's DFS Kit complete*	**£70**
● *DFS Manual (Comprehensive)*	*(no VAT)* **£6.95**

(P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)

● *Watford's sophisticated DFS ROM only*	**£16**
● *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only*	**£12**

● *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

*The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode.
P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!*

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

● *Complete DDFS Kit incl. fitting instructions*	**£66**
● *DDFS Manual*	*(no VAT)* **£6.95**
● *We will exchange your existing Single Density DFS Kit for our DDFS Unit at*	**£35**

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

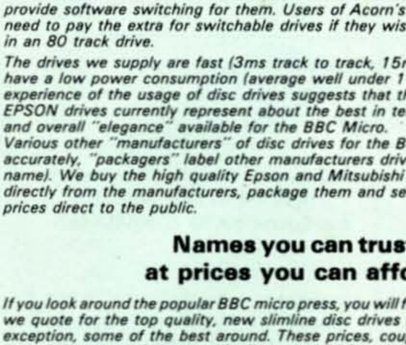
With two prices in a box (e.g. £295/£299), the first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

The drives we supply are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £82		CS100 £105	
200K (360K)	CLS 200 £84	CLD200 £162	CS 200 £107	CD200 £172
400K (720K)	CLS 400 £110 £115 CLS400S	CLD 400 £162	£130 CS 400S	CD400 £175
800K (1.44M)		CLD800 £220 £230 CLD 800S		£235 CD 800S

- TWIN drive CASE, with Power Supply & Cables **£35**
  Securicor carriage on Disc Drives £5

Prefix *C = Cased Drive*
L = Less PSU
S = Single
D = Double

Suffix *S = 40/80 Switchable*

e.g. *CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).*

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × S/S D/D 40 Track Diskettes*	**£13**
● *10 × D/S D/D 40 Track Diskettes*	**£18**
● *10 × S/S D/D 80 Track Diskettes*	**£22**
● *10 × D/S D/D 80 Track Diskettes*	**£24**

QUALITY 5¼" DISKETTES at KNOCK DOWN PRICES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs, each with a life-time guarantee. These are supplied packaged in an attractive plastic library disc box to protect them from damage.

DON'T SETTLE FOR LESS, BUY THE BEST

● *10 ×* **M4** *S-S D/D 40 Track Discs*	**£11**
● *10 ×* **M5** *D/S D/D 40 Track Discs*	**£15**
● *10 ×* **M7** *D/S D/D 80 Track Discs*	**£20**

DISC ALBUMS

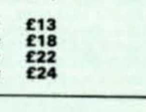
Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

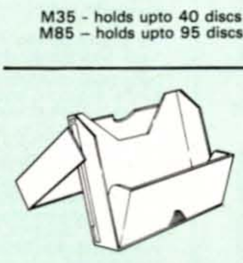
£4.25

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 - holds upto 40 discs	**£10**
M85 – holds upto 95 discs	**£12**





PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE
holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

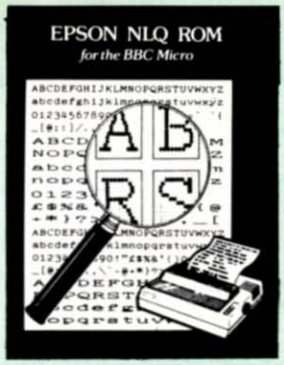
The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20**	Twin (without PSU) **£3.85**
Single (with PSU) **£3.25**	Twin (with PSU) **£3.90**

Continued →



Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

NEW LAUNCH

THE NLQ DESIGNER

The Kaga Taxan KP810 and KP910 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading pur adverts though – work is in development!)

NLQ DESIGNER & FONT DISC **£25**

INDIVIDUAL Preprogrammed FONT ROMS
£15

(Please write in for further details on both the NLQ DESIGNER and the individual font ROMs available.)

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.
Price including comprehensive manual

£24

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) £49

VIEWSTORE £52

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £9

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TRANSFEROM

(Tape to Disc Utility)

The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

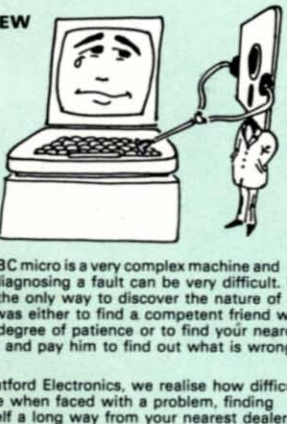
TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£22.00

DIAGNOSTICS DISC

NEW



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £18.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

NEW
ND
6502
HEX
REM
LD
Z80
ASM
CHR$
FAL

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.
Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

ONLY **£16**

Please write in for technical details.

ROM MANAGER

Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

Price **£20**

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

SPOIL-SPORT ROM

BANISH GAMES . . . DEVELOP BRAINS
Is it that all too often your BBC Micro is being used to stage intagalatic war? Would you rather it was put to a better use?
The answer is now simple. Fit a WATFORD SPOIL-SPORT ROM.

It will:

- Stop machine code games being played on your BBC MICRO.
- Promote serious BASIC programming.
- Allow you to 'UNLOCK' your micro only with a preprogrammed password (in ROM).
- Interface with both disc or tape based micros.

Only £20

(Please specify password required when ordering.)

SPARK DUMP ROM

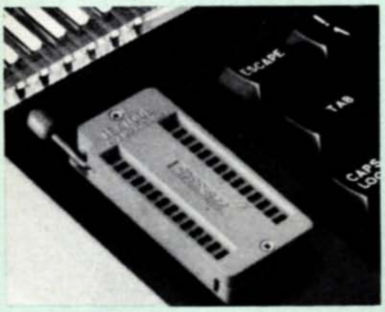
A screen Dump ROM for the Acorn/Olivetti Spark jet printers. Works in modes 0/1/2/4/5/7. Does vertical & Horizontal scaling. Positive & Negative grey scaling.

Only: **£12**

CLARE's SOFTWARE

BROM ROM	**£29**
BROM DISC	**£23**
BETA ACCOUNTS PACK	**£21**

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

NEW

16K Sideways RAM Modules

The revolutionary design RAM Module you've been waiting for! Write and Read protectable, with optional battery backup. Works in a standard BBC micro or one with a ROM board.

Just look at the features:

- Compact construction.
- Fit multiple units with ease.
- No overloading problems.
- Free utilities software supplied on disc.
- Works with any ROM.
- Ideal for professional software development.
- Can be used as a 16k printer buffer as well.
- Load ROMs as needed – no messy unplugging, etc.

Introductory price: **£29**

Optional extras

BATTERY BACKUP	**£3**
READ and WRITE protect Switches	**£2**

(Supplied already fitted if ordered with the Module)

LOGOTRON LOGO

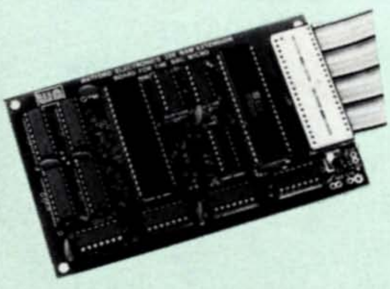
The popular Logotron Logo in ROM.
Recommended by most Education authorities.

Only: £55

32K RAM-

PRINTER BUFFER

EXPANSION BOARD



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- In "VIEW", type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc).
- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.
- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Offer price

Only: £60

(Price includes a comprehensive manual and the ROM)

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

BEEBFONT ROM

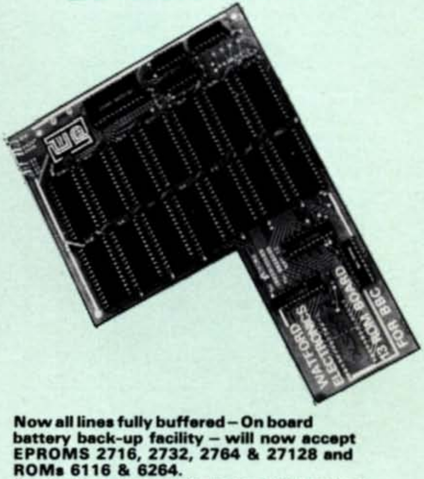
BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£25**

(Please write in for technical details)

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.

£2

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
INTER-SHEET	£48
INTERCHART	38
TERMI	£27
COMMUNICATOR	£58
SPEECH ROM	£25

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER: **£32**

WORDWISE PLUS

FREE this month, the superb Word-Aid ROM with every package of Wordwise Plus bought from us **£47**

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for **£19.** Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Take advantage of the programming language in Wordwise-Plus. Simply load the disc with Shift-Break and have the power of these sophisticated new features instantly at your fingertips.

Features:

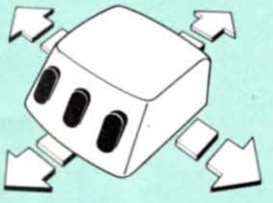
- Mail Merger
  - Can use Data files spooled from Wordwise-Plus.
  - Can use Data files from most databases.
  - Powerful Label printing facilities.
  - Mail merges with names, addresses etc. inserted into a standard letter.
- Address Finder
  - Search for names.
  - Search for addresses.
  - Insert names into text.
  - Insert addresses into text.
- Print/Preview continuous files.
- Chapter Marker.
- Search and Display.
- Remove embedded commands.
- Text transfer.
- Printer Codes – make embedding commands easier.
- Utilities supplied compressed for speed.
- Utilities supplied anotated for help.
- Supplied on 40/80 format disc.
- Very user friendly.
- Recommended by Computer Concept.

Introductory Offer: **£12**

(Further details available on request SAE, please).

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



ONLY: £67.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX Desk package	£19.00
AMX UTILITY package	£11.50

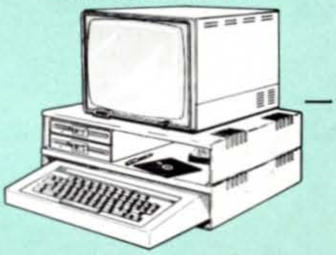
COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really bring those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Special Offer: **£10** (£7 carr.)

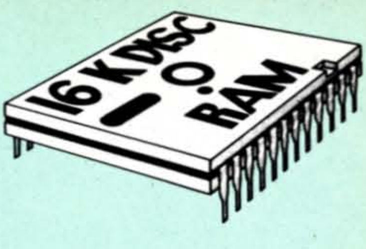
(please specify 40 or 80 track disc when ordering)

PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £2.00)
PRINTER PLINTH	**£10** (carr. £1.50)



This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile BEEB SPEECH SYNTHESISER Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

In recognition of the plight of the starving Ethiopians, Watford Electronics has decided that 10% of the proceeds from its new launch product, Word-Aid, should be donated to the Band-Aid Appeal Fund. It is hoped that this gesture of goodwill and friendship will be followed by more members of the Software/Hardware industry.

Continued ⟶

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
100 Programs for BBC Micro	£6.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£19.95
6502 Machine code for Humans	£7.95
68000 Assembly Lang. Programming	£19
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£**XXX**
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Programming made Easy	£5.95
Basic ROM User Guide	£9.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Assembly Language	£7.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Games Master	£5.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
BBC User Guide	£10.00
BBC Wargaming	£8.95
Basic Programming on BBC Micro	£5.95
BCPL User Guide	£15
Brain teasers for BBC micro	£5.95
Business Applications on BBC	£7.95
Computing for All the Family	£6.45
CP/M Bible	£16.00
CP/M Handbook with MPM	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Disc System for the BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
Easy Programming for the BBC Micro	£5.95
Electron Machine Code for Beginners	£6.95
Exploiting BBC Basic	£6.95
Exploring FORTH	£6.95
Filing System & Databases	£7.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphics for Children	£7.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Hackers Handbook	£4.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Interfacing Projects for the BBC	£6.95
Introducing the BBC Micro	£5.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£16.50
Let your BBC teach u to program	£6.45
LISP	£9.25
LISP, A Beginners Guide to	£10.95
LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£16.50
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
Programming with Graphics	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£6.95

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

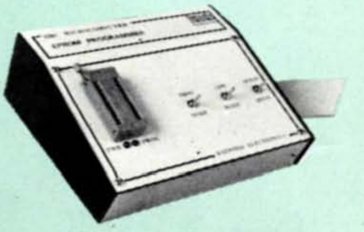
- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£95 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE
The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:
Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.
Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69
(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.

The features are:

- Will program 2716, 2732, 2532, 2764 &

27128 EPROMs.

- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

TEX EPROM ERASERS

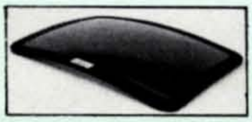
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE

DELTA-14 JOYSTICK	**£12**
Adaptor Module	**£12**
Transfer Software	**£7**

ANTI GLARE MONITOR SAFETY SCREEN



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Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

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A 'Keyboard to Micro' replacement jumper lead.

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Disc Drive Plug 4 way	**75p**	–

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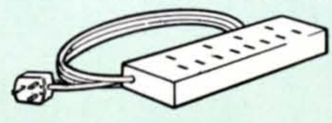

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NEW LAUNCH

DELTA CARD

Delta is the latest in add-ons for the BBC Micro. Mounting internally, this unit provides a new CPU to run your programs at TWICE their original speed (i.e. a massive 4 MHz!). Even better than this, you can run applications programs such as Wordwise Plus, ViewSheet, Pascal, etc. at twice their speed. Whereas a 6502 Second Processor increases the speed of a standard BBC by about 50%, the combination of a BBC and Delta Card runs at twice the speed of a standard BBC! Unlike second processors, full compatibility is achieved with all standard software.

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How well do you know your BBC Micro?

THE MICRO USER

ADVANCED USER QUIZ

1 Which IC is the odd one out – 6522, 6845, 6850 or 8255?

2 What does FDC stand for?

3 How many pins has the 6502A processor?

4 Which OSBYTE call allows the bell (VDU 7) frequency to be altered?

5 Is 7 EOR 5 = 3 EOR 4 EOR 5?

6 Which 6502 instruction sets bit 4 of the status register and causes an interrupt?

7 What is the screen start address for Mode 5?

8 Which number would you find on a 16k EPROM – 27256, 27128, 2764, 2732 or 2716?

9 Which VDU command can be used instead of PLOT?

10 What is ROM service call 7 used for?

Answers next month

Answers to last month's quiz:

1. Versatile Interface Adapter
2. 150
3. &FC Fred
   &FD Jim
   &FE Sheila
4. &C000-&C2FF
5. *RUN
6. FALSE
7. VDU21
8. VDU6
9. &355
10. 5-A,X,Y, Stack Pointer and Status Register (6 if you include the Program Counter).

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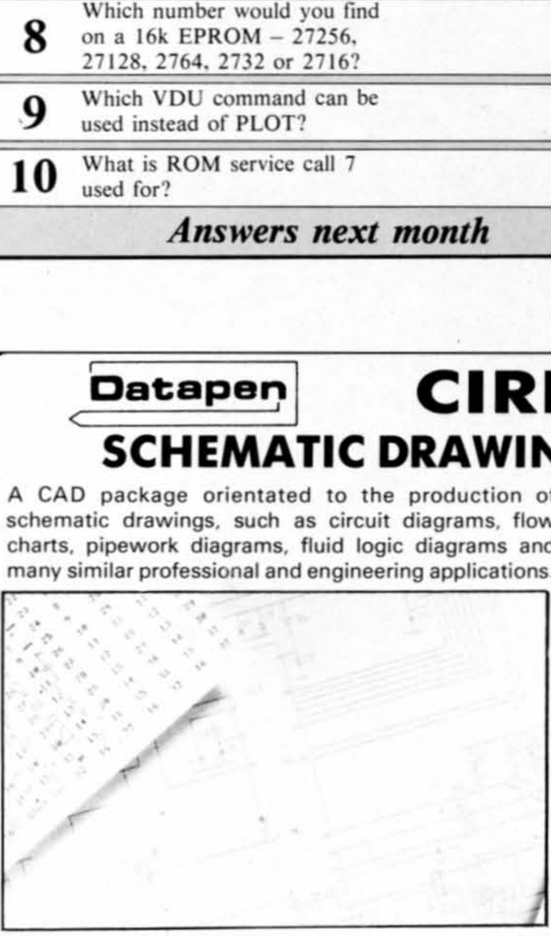

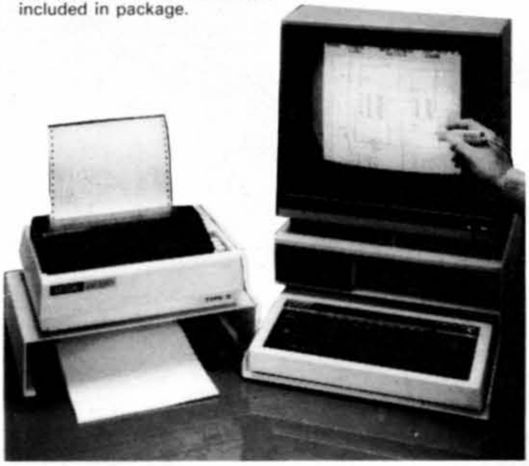

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CUB COLOUR MONITORS DISPLAY THE WIDEST CHOICE

The Cub 653 featured here is the perfect mate for computer users who wish to combine the advantages of brilliant, low cost colour graphics with professional 80-column software. Yet it is only one of a range of 26 superb models in the Cub range.

This includes 14" and 20" monitors in resolutions ranging from 452 to 940, together with the Cub RGB/PAL displaying the best in both computer graphics and video pictures.

Naturally, with a range as wide as this, compatibility extends to virtually every micro. Add the many cabinet options and it becomes clear why Microvitec's British designed and built Cub range of monitors lead the field.

RESOLUTION 653

Screen size 14"
Tube Resolution (pixels) 653(H)
Pitch 0.43mm
Bandwidth – 18MHz
Input – TTL with PAL/AUDIO option
CRT – super high contrast
Cabinet options – plastic (featured)
tilt and swivel
metal
structural foam

14" Resolution 452 PAL/RGB
with Metal Cabinet

14" Resolution 895
with Tilt and Swivel Cabinet

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with Metal Cabinet

MICROVITEC
cub
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KARATE WARRIOR

Win your black belt in this gruelling test of karate skill from MATTHEW HOLROYD

AS a pupil at the temple of Tanhii you have been trained in Taijutsu, the Ninja's art of unarmed combat. Now comes your final test. Before leaving the temple to become a Warrior of the Night you must fight against another opponent who wishes to qualify like you.

Both of you are fantastic fighters, with hands and feet of steel. Your opponent eyes you, then circles to the left. You step to the right, following the curve of the arena.

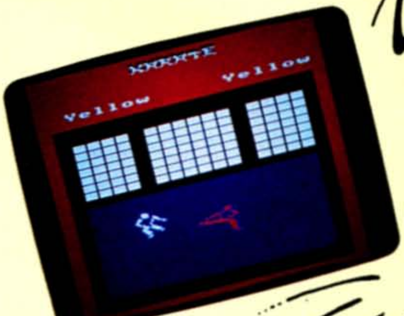
He stops and leaps forward, attempting a Tettsui-uchi, but you are quick and adopting the Kokutsu Dachi stance you deliver a block with your right forearm.

Then you whirl round and float into the air. Your feet clasp around his face and you spin, sending him flying with a Teeth of Tiger throw. He lies dazed on the floor. You bow and then leave the arena. You have got your first belt.

The aim of the game is to become a black belt before your opponent does. This is done by winning each fall. Both of you start off with white belts and must each win five falls to reach blacks.

Each player has four moves. These are:

Yoko Geri Chudan:	*Side kick to the ribs or chest.*
Kansetsu-Geri:	*Knife kick to opponent's ankles.*
Kakato-Geri:	*Jumping heel kick to the jaw.*
Somersault:	*Back flip used in retreat.*



When striking with a Yoko Geri Chudan the player will automatically move forward. This kick is used to advance towards your opponent and is also the most common kick used.

The Kansetsu-Geri is a very useful and effective kick as it is used to topple an unaware opponent. When kicks are being delivered the move can be used to duck or dodge a strike and also to swipe away the foundation leg.

The Kakato-Geri is a spectacular flying kick to the jaw. This kick is very advanced and also safe as you cannot be struck when you are using this move. It can be blocked using a Yoko Geri Chudan or can be dodged using a Kansetsu-Geri.

When you feel uneasy or open to attack a somersault is a very useful move. It is the safest move as you cannot be touched while you are flying through the air, but it allows your opponent to advance. You cannot always somersault, only when you are far enough away from the edge of the arena.

The game is quite complicated in the

PROCEDURES

caller	Calls the machine code routine which reverses the characters.
delay()	Makes a delay.
kick1,2	Control the normal kicks of the two players.
hikick1,2	Control the high kicks of the two players.
sweep1,2	Control the sweeping moves of the two players.
som1,2	Take care of the somersault.
init	Defines the variables.
stance **kickchars1,2** **hikchars1,2** **sweepchars1,2** **somchars1,2**	Define the characters for the moves.
reverse	Machine code routine used to reverse characters.
screen	Draws the screen.
check	Checks when the players are striking and acts accordingly.
deadchars1,2	Characters for the dying men.
man1dead	Displays player 1 dying.
man2dead	Displays player 2 dying.
nextbelt	Works out the next belt for each player.
start	Controls the start of each fall.
win	Prints the winning screen and draws the winner.
bow	Characters for the bowing men.
inst	Instructions.
freeze	Freeze facility.

way it prints out the men's different positions. Because the characters are so large and there are so many different positions we define the characters for each new position just before we print them.

This is because each man is made up of 12 characters and as there are 12 possible positions of each man, we would soon run out of spare character spaces if we tried to define all these at the beginning of the program.

Only the characters for the positions of the man facing right are defined. Then, in the program, we use a small machine code routine which reverses the characters to produce a man facing left. Using this technique we save half the work when defining, and half the work when typing in.

Karate listing

```
   10 REM ###    KARATE     ###
   20 REM ###    (C) THE    ###
   30 REM ###  MICRO USER   ###
   40 REM ### BY M.HOLROYD ###
   50 REM ###               ###
   60 MODE5
   70 belt1%=1:belt2%=1:ki1%=0:ki2%=0
:PROCreverse:PROCinit:PROCscreen:PROC
nextbelt(0)
   80 SOUND1,2,1,6
   85 IF @%<>1234567 PROCinst
   90 PROCstart
  100 IFINKEY(-82)ANDE%=0THENPROCkick
1
  110 IFINKEY(-73)ANDR%=0THENPROCkick
2
  120 IFINKEY(-66)ANDE%=0THENPROChiki
ck1
  130 IFINKEY(-89)ANDR%=0THENPROChiki
ck2
  140 IFINKEY(-67)ANDE%=0THENPROCswee
p1
  150 IFINKEY(-105)ANDR%=0THENPROCswe
ep2
  160 IFINKEY(-2)ANDE%=0THENPROCsom1
  170 IFINKEY(-74)ANDR%=0THENPROCsom2
  180 IFINKEY(-34)THEN*FX210,0
  190 IFINKEY(-17)THEN*FX210,1
  200 IFINKEY(-68)THENPROCfreeze
  210 IFINKEY(-38)THENPROCinst
  220 IFE%=1THENPROCkick1
  230 IFR%=1THENPROCkick2
  240 IFE%=2THENPROChikick1
  250 IFR%=2THENPROChikick2
  260 IFE%=3THENPROCsweep1
  270 IFR%=3THENPROCsweep2
  280 IFE%=4THENPROCsom1
  290 IFR%=4THENPROCsom2
  300 GOTO100
  310 DEFPROCcaller:A%=224:CALL&900:E
NDPROC
```

Listing continues on Page 147

VARIABLES

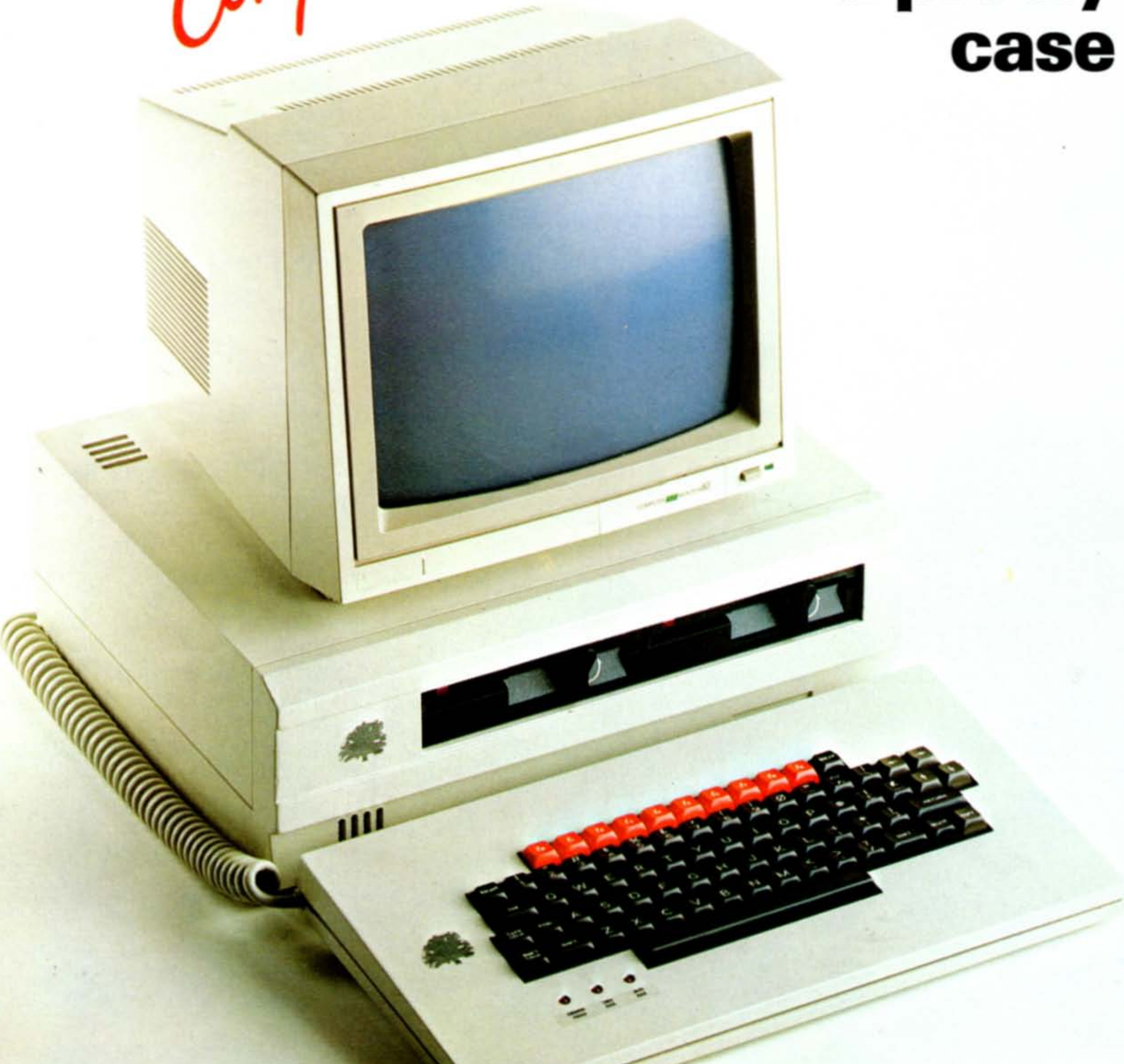
belt1%	Player 1's belt.
belt2%	Player 2's belt.
X%	Player 1's x coordinate.
N%	Player 2's x coordinate.
B%	Set to 1 if striking, 0 if not.
C%	Set to 1 if striking, 0 if not.
E% **R%**	The code for each move, *E%* for player 1, *R%* for player 2.
I%	Controls the animation of each of player 1's moves.
J%	Controls the animation of each of player 2's moves.
man$	Player 1's man.
man2$	Player 2's man.
M%,O%	Used in PROCcheck to compare to *I%* and *J%*.

KEYS USED

PLAYER 1		*PLAYER 2*
CTRL	Somersault	**RETURN**
A	High kick	**]**
S	Side kick	**:**
X	Sweeping kick	**/**
W	Sound on.	**W**
Q	Sound off.	**Q**
F	Freeze.	**F**
R	Restart.	**R**
I	Return to Instructions.	**I**

OAK *Personal Computer*

More than just a pretty case



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Models can be supplied incorporating BBC B internals from £435.00. Telephone for further details. All other specifications are available. All prices shown above are exclusive of VAT and delivery.
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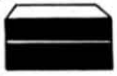

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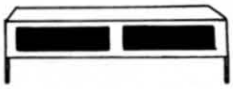

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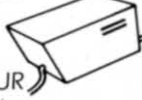

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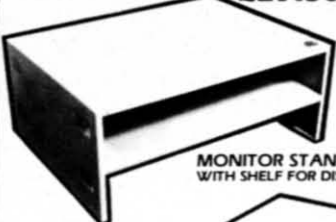

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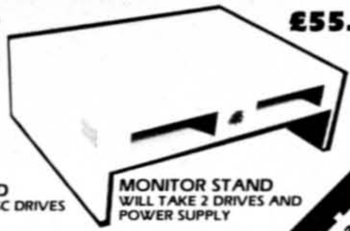

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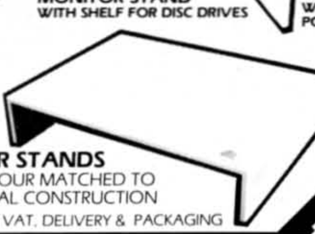

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THE GREAT PIMANIA PUZZLE

MY philosophy and advice about "real treasure" hunts is *caveat emptor* – let the buyer beware. You pay your entrance fee, get the puzzle and then have to decide how much the designer can be trusted to know his job – hence how much time and effort you are going to expend.

Usually you get a better return betting on horses.

When I first saw, and reviewed Pimania – Automata UK – last year, I thought it a good and fair puzzle. The prize obviously did exist and, although requiring some persistence to overcome the random elements, there had to be a unique, verifiable date and place to discover.

Once solved you only had to be there at the right time, answer some obvious questions – the program warns you that you will be grilled – and the £6,000 sun dial was yours.

The prize had not been claimed for over two years but recently Keith Campbell – adventure reviewer for Computer and Video Games – published the date as the 22nd of July – 22/7 = Pi – get it? Quite clever really.

However it ain't enough to know the answer – you have to know why. So here is the full solution, provided by a reader who wishes to remain anonymous.

The first thing the program wants is a password – it's two letters and I'll give you 3.14159 guesses what that is.

Once into the game you move around using directions 1 to 12 – remember the old analogue dials on clocks and watches? – and constructing the map in Figure I is not difficult.

Actually the map resembles, quite deliberately, a horse looking to the left and there are some odorous puns to link the various parts of its anatomy to the –surprise, surprise – 22 rooms.

Your start in the Arena of Despair and the problem is to convert – swap – the correct seven objects via the PI man and then drop the new objects in the Cavern of Ivory – Room 7, actually the mouth of the horse which, I think has 22 teeth.

At this point you enter the number 22 and:

"At last by accident or design you have returned through the ultimate gate of PI. Remember where you have been and what you have seen and heard. Remember too those gifts that unlocked the gate. Distil this knowledge and meet me at noon on the right date and location revealed. I shall be waiting for you every year bearing the golden sundial of PI".

Actually there are a number of other confirmers that the numbers are 22 and 7 but the clinchers are dropping the right seven objects in the Cavern of Ivory and saying 22 to get out.

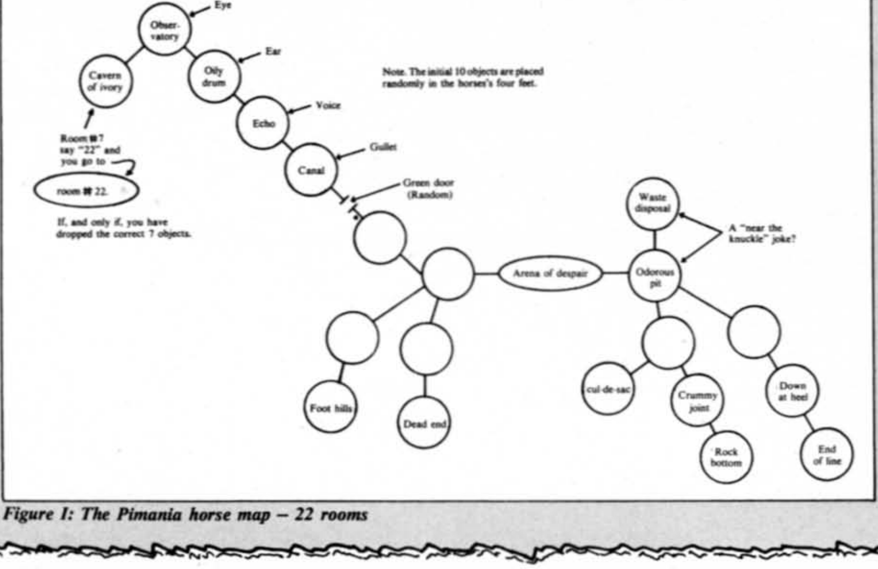
If you have a copy of the program you can easily find out which seven objects are required (answer next month). All you have to do is alter the two arrays *O%(20)* and *Q%(20)* to put all the 10 converted objects where you want them.

The simplest thing is carry them – a negative number indicates this – and put yourself in the Cavern of Ivory (set *g*=7). To restart from this "poking" type RUN 200 and, lo and behold, you can now SAVE the position and then experiment to find out which are the critical seven objects.

Note that Keith didn't know – or wouldn't say – WHERE to be on the 22nd of July. Now if no place was given in the program then you'd expect it to be hidden in the messages – à la Masquerade. BUT an address is given by the PI man at one point in the game – see line 3344 – namely:

65a OSBORNE ROAD,
PORTSMOUTH.

and the plot now thickens because



Eye
Obser-vatory
Ear
Cavern of ivory
Oily drum
Note. The initial 10 objects are placed randomly in the horses's four feet.
Voice
Echo
Room # 7 say "22" and you go to
Gullet
Canal
room # 22.
Green door (Random)
If, and only if, you have dropped the correct 7 objects.
Waste disposal
A "near the knuckle" joke?
Arena of despair
Odorous pit
cul-de-sac
Down at heel
Foot hills
Crummy joint
Dead end
Rock bottom
End of line

Figure I: The Pimania horse map – 22 rooms

Automata are no longer at that address but the current occupants always seem to know where they have moved to.

Last year Automata were at 27 Highland Road. Could be – two Germans thought the PI man's legs looked like 27 and turned up on the 27th of July last year.

So this year A. Nonymous covered four addresses in Portsmouth on D-Day, sorry PI day. Result? Rien. The reason was that Automata on that day were giving the Golden Sundial to two Yorkshire lasses in the horse's month on Windover Hill in Sussex. If you want to know why that was the 'where' then send Automata an SAE plus £1 for the complete solution. (PO Box 78, Portsmouth.)

Two months ago I briefly mentioned a puzzle which required the punter to cover a three-sided pyramid – a tetrahedron – with an (implied) unique pattern of 36 triangular tiles and then calculate a 12-digit number from the result.

In order to perform the calculation the value of a single tile – see Figure II was given as 126. If you read the three sides of the tile as 4-bit bytes then you obtain 3,6 and 7 which, when multiplied together, give the required number.

This was just a coincidence because it may be the *simplest* decode but it is not the way the designer intended – or even realised – that the tiles could be numbered.

Even worse, a number of people programmed the puzzle only to find that there are hundreds of ways of tiling the pyramid and each guess – even if you applied the more complex and obscure coding – cost £10.

The easy puzzle this month is to invent another way of deriving 126 from the given tile. I'm curious to see how more-complex minds than mine work out such codes.

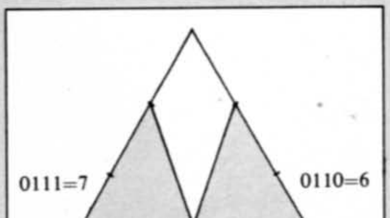
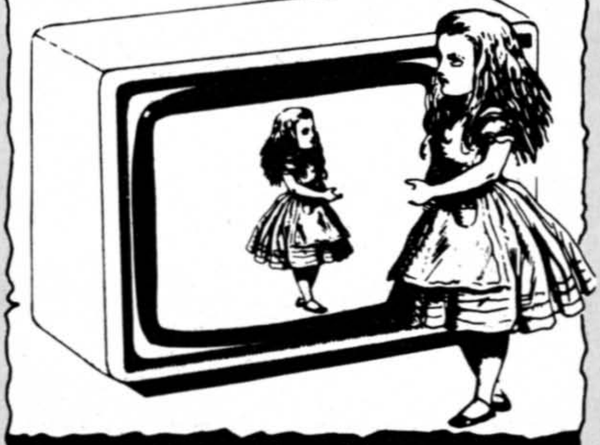


Figure II: The incorrect decoding of a tile

Alice through the VDU



Our monthly foray into Adventure games

Hints ignored

AN intriguing game that starts well is Quondam from Acornsoft. First of all the box art is eye-catching and obviously giving clues via a weird collection of disparate objects.

It depicts a palantir, a knight in armour and a bottle mixed up with a modern gangster, cards and a corkscrew.

From the start you can go in four directions – West to a spider's web, NE to find a bird, North to the (bent) knight who immediately blocks the way and Down to a Junk Room.

The Junk Room is the most interesting start but it takes a while to break out and you are then conned into a meeting with a homicidal Customs official closely followed by the Spanish Inquisition and not a soft cushion nor comfy chair in sight.

For once in my career I have not steamed open the hints envelope, so all I have achieved is planting a sapling which gives me some idea of where to hang my little treasures.

This untypical willpower is mainly due to laziness – why should I solve them all? – and partly because of the challenge that "this is a text adventure for advanced players".

I asked Jon Thackray – the co-author of Acheton, probably the best, certainly the biggest, classic text adventure on the BBC Micro – exactly how Acornsoft rated the difficulty of their games.

Apparently Jon and colleagues are given them to test at work and also help to devise the set of hints for "the most commonly asked questions".

Fancy having to play adventures for a living – I trust they don't have their salaries related to how good they are, because there is a vast difference between inventing puzzles and being able to solve them. Like mate problems in chess, you have to be very careful to ensure that there is a solution and that it is deducible by some form of logic and not guesswork.

Another reason for ignoring the hints is that I actually managed to solve the spider web maze on my ownsome. You have to go in a spiral and so does this month's puzzle which I have called Lac Dracula just to prove that for almost nothing – taxman please note – I regularly devise better, more original puzzles than many of the professionals. No wonder they go broke.

Circular epic

LAC Dracula (Canoworms) is another epic game – over 7,000 rooms – with a genuine interactive character. His movements are not random but depend entirely on what you do. The game also requires understanding a principle which can be applied with varying degrees of success.

You start in a rowing boat 100 feet from the north shore of a circular lake 4000 feet in diameter – see Figure III.

A vampire is due North and unable to cross the water until nightfall. You must escape before then but the problem is that he can run nearly four times faster than you can row – you can't just pull straight for the shore because he can always intercept you.

A further problem is that even if you

→

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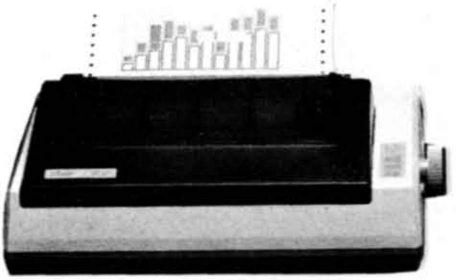

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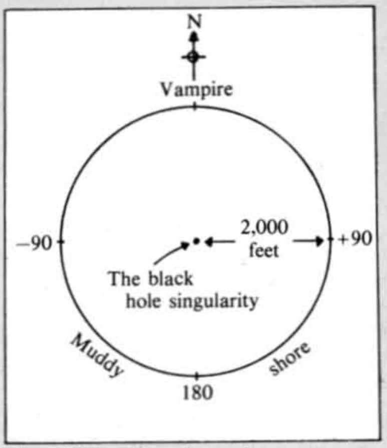

Figure III: Lac Dracula puzzle

From Page 65

reach the shore a great deal of the lakeside is too muddy to land safely. Due North is safe ground, but just how close can you land to it? The best method is backtrack – or backrow – analysis.

I don't know the optimum solution but I think it can be done in fewer than 100 moves where a move M is 100 feet in any of the eight compass directions. If you want a rest from rowing type R.

Of course the game should really be graphical and driven from a joystick – if you want to try that conversion make M=10 or even 1 – but note that the lake shore gets muddier and a safe landing more and more difficult. The program is ugly partly because I want the same message for every fatality but also to re-air my scepticism about Black Holes.

```
   10 ON ERROR GOTO 40
   20 M=100:        :REM MOVE - CAN MAK
E SMALLER
   25 X=0:V=0:B=0:NIGHTFALLS=FALSE
   30 S=2000        :REM SHORE
   40 VM=200*M/S  :REM V MOVES NEARLY
 4 TIMES FASTER
   50 Y=S-M         :REM START CLOSE
   60 Z=SQR(M*M/2):REM DIAGONAL MOVE
   70 REPEAT
   80 R=SQR(X*X+Y*Y)
   90 PRINT"YOU ARE AT ";INT(R);" BEA
RING ";INT(B);". V IS AT ";INT(V)
  100 IF S-R>M/2 THEN 170:REM KEEP RO
WING
  110 PRINT"YOU'RE CLOSE TO THE SHORE
 --- ";
  120 IF ABS(B)<3*VM THEN 150:REM VAR
IABLE SAFETY
  130 PRINT"BUT IT'S VERY MUDDY HERE"
:GOTO 160
  140 PRINT"THE BLACK HOLE WHIRLPOOL
IS HERE!":R=S+1:GOTO 160
  150 IF ABS(B-V)<20 THEN PRINT"AND T
HE VAMPIRE" ELSE PRINT"AND SAFE":END
  160 IF R>S THEN PRINT"YOU'RE SUCKED
DOWN OR OUT":END
  170 INPUT D$
  180 IF D$="N" THEN Y=Y+M
  190 IF D$="S" THEN Y=Y-M
  200 IF D$="E" THEN X=X+M
  210 IF D$="W" THEN X=X-M
  220 IF LEN(D$)<2 THEN 250
  230 IF INSTR(D$,"N")>0 THEN Y=Y+Z E
LSE Y=Y-Z
  240 IF INSTR(D$,"E")>0 THEN X=X+Z E
LSE X=X-Z
  250 B=ATN(X/Y)*180/PI:REM NEW BEARI
NG
  260 IF Y<0 AND X>=0 THEN B=B+180
  270 IF Y<0 AND X<0 THEN B=B-180
  280 D=B-V
  290 IF D>180 THEN D=D-360
  300 IF D<-180 THEN D=D+360
  310 IF D>0 THEN V=V+VM ELSE V=V-VM:
REM V MOVES
  320 IF V>180 THEN V=V-360
  330 IF V<-180 THEN V=V+360
  340 IF ABS(D)<=VM THEN V=B:REM V WA
ITS
  350 UNTIL NIGHTFALLS
```

Mrs T's maze solution

OUT of sequence but no one has managed to keep the 21 prisoners chained together for 15 days so I set an easier puzzle and what do I get?

Dear Alice,

You must be slipping. I solved one of your puzzles – with the help of a computer. I found the exit in 31 moves:

ESESENNNESWSESSWWW WNENWSSEEEENE

Not bad for two nights' work – I've been trying the Hacker problem for a month.

D. Vickers St. Albans

Mr A.D.H. Slade of Penzance also found the same solution – a funny coincidence because there are actually four minimum solutions – 31 moves – to the problem. There are alternatives at moves 2 and 21.

Peter Derlien of Sheffield found them all and also drew a map showing the best routes from Room 6, Grantham, to Room 21, Downing Street. He used a forward searching program which yielded 14 solutions – 10 are greater than 31 moves – in approximately 10 minutes.

He then did a backwards search and found 11 solutions in just over two minutes.

The puzzle he has set me – and therefore you lot – is why this asymmetry between forwards and backwards searching?

As for the Hacker problem in the May issue of *The Micro User*, I promised to reveal all this month. Figure IV shows how we substitute the bee on the comb (123 . . . 19).

ALICE

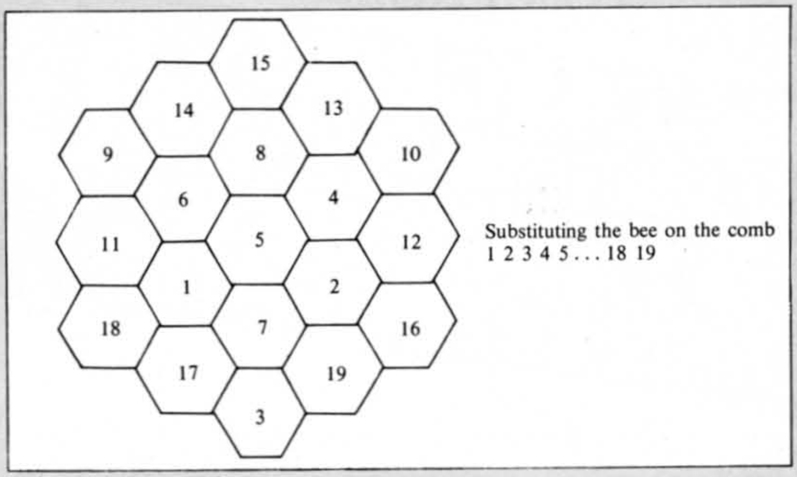

Figure IV: 21 prisoners solution

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Busy doing nothing...

... but the subroutines described here by PAUL OVERAA are surprisingly effective

THE two programs we are about to discuss are routines that will *never* be bettered for compactness, speed and elegance. They are also the only routines that I have ever written or used that I would dare to make such remarks about.

What are they? On the face of it they are routines that do nothing at all, but in practice such routines can be used in some interesting ways.

Two examples are going to be discussed. The first is quite common and easy to understand. The second is a little bit more devious and provides a means of obtaining the addresses of variables and arrays and so on by forcing Basic to do all the hard work for you.

The first subroutine, written in Basic, is a classic:

```
4970 REM =====================
4980 REM DO NOTHING SUBROUTINE
4990 REM =====================
5000 RETURN
5010 REM =====================
```

Without the REMarks it consists of the single Basic statement RETURN. Let's give you a simple example of its use.

You may during some stage of a particular program provide a screenful of "options" and ask the user to select an "option number". On the basis of that option number the program may then perform a particular subroutine to carry out the chosen operation.

The code in question would most likely be based on a type of arrangement such as the following:

```
400 INPUT"Please enter required Optio
n Number",SELECTION%
410 IF SELECTION%>0 AND SELECTION%<6
THEN ON SELECTION% GOSUB 1000,1500,20
00,2500,3000
420 and so on
```

where 1000, 1500, 2000, 2500 and 3000 are the subroutines that perform the processing related to the five possible options. At times you may have some of these options which are non-operational – for example the program may be in the development stage.

Suppose that you wish to prevent subroutine 2000 from being used in the option selection procedure.

You could rewrite the condition in the above line 410 by combinations of AND and OR as in:

```
410 IF (SELECTION%>0 AND SELECTION%<3
) OR (SELECTION%>3 AND SELECTION%<6)
THEN .....
```

A much tidier alternative is just to replace the reference to subroutine 2000 with a reference to a subroutine that does nothing, like this:

```
400 INPUT"Please enter required Optio
n Number",SELECTION%
410 IF SELECTION%>0 AND SELECTION%<6
THEN ON SELECTION% GOSUB 1000,1500,50
00,2500,3000
420 and so on
```

The 5000 in line 410 is the reference to the "do nothing" subroutine that was illustrated above.

This approach is quite useful when you have a large number of option numbers not all of which correspond to implemented routines. Perhaps you wish to leave room for future expansion and such like.

One typical concrete example is the detection of "control characters" – characters whose Ascii codes are less than 32. On the basis of such codes you may wish to perform various actions by calling some appropriate subroutines.

It is quite likely that you will not use all control characters – there will therefore be gaps in the numerical sequence that make verification a bit untidy. Let us suppose for instance that in some program or other you are using control codes to signify the actions outlined in Table I.

We use our ON condition GOSUB arrangement and fill in all the subroutine addresses that correspond to useful actions. All of the other possible responses will simply reference the "do nothing" subroutine. In this way we can safely ignore all control codes that are not being implemented by using code such as the following:

```
400 REM Have ASCII code of character
in X$
410 IF ASC(X$)<32 THEN ON ASC(X$) GOS
UB 5000,5000,5000,8500,5000,9500,5000
,5000,5000,5000,9000,5000,5000,5000,5
000,8000,5000,5000,10000,10500,5000,5
000,5000,5000,5000,5000,5000,5000,500
0,5000,5000
420 and so on
```

Easy, yes, but still very useful. Let us now look at another useful "do nothing" routine, this time using a 6502 assembler instruction.

Procedure calls are extremely powerful. Most Basics, except ones that run on machines like Hewlett Packard, DEC mainframes and so on, do not support such calls, but BBC Basic is an exception.

It is limited however in that you cannot pass complex data structures –

→

Control character	Decimal equivalent		Operation to be performed	Subroutine address
^P	16	=	switch on/off printer	8000
^D	4	=	switch on/off display	8500
^K	11	=	kill current working file	9000
^F	6	=	find specified file	9500
^S	19	=	save specified file	10000
^T	20	=	display current elapsed time	10500

Table I

From Page 69

not even simple arrays. The usual way around this problem is to find the start address of the array and then pass that to the procedure.

It is possible to determine the addresses of variables, including arrays, very easily by using a "trick" that forces Basic to do the work of finding the address for us. First let us look at the necessary "do nothing" routine that we shall make use of.

```
* ============================
* DO NOTHING SUBROUTINE
* ----------------------------
* RTS
* ============================
```

Again this is essentially a single instruction subroutine consisting of the op-code &60 which is the op code for the 6502's RTS instruction.

In practice we don't actually have to explicitly write the routine – all we need to do is find a byte in the operating system ROM that has the required &60 value and use that as our "subroutine".

The first thing to do was to search the operating system ROM – its lowest address is 49152 decimal – using a simple Basic loop as follows:

```
10 FOR I%=49152 TO 64512
20 IF ?I%=&60 THEN PRINT I%:STOP
30 NEXT I%
```

This rapidly told us that &C028 was the first location holding the "RTS op-code". So, now we have an assembly language equivalent of our "do nothing" subroutine – let us put it to good use.

The Basic instruction CALL is used to call assembly language subroutines. If you peer into the user guide you will see that when a CALL statement is issued a parameter block is set up starting at &600 that specifies the number of parameters being passed, together with the addresses and type codes for each of the variables in question.

For our purposes all we need to know is that the address of the first parameter passed is held in the two bytes starting at &601 – this is &601,&602.

Let us suppose that in some program we have a variable called *TEST%*. If we issue the statement CALL &C028,TEST% the following situation occurs. We force Basic to set up the parameter block at &600 and then jump to our "do nothing" subroutine which immediately returns control to Basic.

What has happened, of course, is that although the assembly language subroutine has done nothing at all *we have forced Basic to set up the parameter block for us.* From this parameter block we can retrieve any addresses, type details and so on that we need.

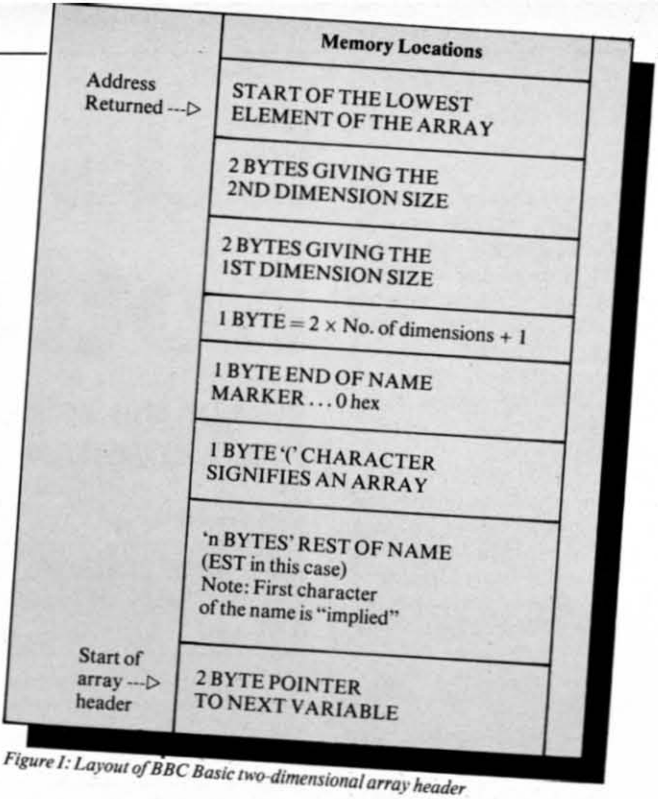
Memory Locations
Address Returned
START OF THE LOWEST ELEMENT OF THE ARRAY
2 BYTES GIVING THE 2ND DIMENSION SIZE
2 BYTES GIVING THE 1ST DIMENSION SIZE
1 BYTE = 2 × No. of dimensions + 1
1 BYTE END OF NAME MARKER . . . 0 hex
1 BYTE '(' CHARACTER SIGNIFIES AN ARRAY
'n BYTES' REST OF NAME (EST in this case) Note: First character of the name is "implied"
Start of array header
2 BYTE POINTER TO NEXT VARIABLE

Figure 1: Layout of BBC Basic two-dimensional array header

You can play around with tricks like this for ever and a day, so let us stick to a particular single example. We want to find the start address of a two-dimensional array declared in a program using DIM TEST(20,20).

We cannot pass a complete array using the CALL statement but . . . it is in fact quite possible to pass individual elements of such an array. To pass the lowest element, *TEST(0,0)* and obtain the address of that lowest element, we use the following code:

```
CALL &C028,TEST(0,0)
ADDRESS%=(!&601 AND &FFFF)
```

The "pling" operator ('!') works using the four bytes starting at &601. The address we are after is actually in bytes &601 and &602, so we use the AND &FFFF operation to ensure that the address is formed only from the contents of the lowest two bytes.

We need to be a bit careful because the address that is passed back is not the start of the "array header", it is the start of the element *TEST(0,0)*. Figure 1 gives the brief details of the difference in locations between the array header and the start of the first element.

If you do some quick sums you will find that for two-dimensional arrays the start of the array header is obtained by using the following "rule":

header address = address of first element −8 −(length of array's name).

The array name is defined as all characters in the name up to but NOT INCLUDING the first bracket '('. Thus *TEST(0,0)* has a name length of 4, whereas *TEST%(0,0)* has a name length of 5. The final version that gives us the required address is therefore given by:

```
400 CALL&C028,TEST(0,0):REM Set up Pa
rameter Block
410 ADDRESS%=(!&601 AND &FFFF)-12:REM
 Get start of the array
```

We arrive at the 12 in line 410 via 8 plus 4 since the array name is *TEST*

So that's it – two lines of trick code and you force Basic to do all the work of searching for a particular variable or array for you. BBC Basic will of course handle any error conditions such as would occur if the array does not exist.

One quick word of warning. Do make sure you use the address immediately – as we have done by transferring it to the variable *ADDRESS%* – after the CALL statement, otherwise Basic will almost certainly overwrite the information it has placed into the parameter block.

You can do similar types of things with most versions of Basic and often to good effect. So next time someone shows you a routine that "does nothing" look at it very, very carefully – it may be more useful than you think.

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The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 96 per cent of MicoLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages – at a third of the cost

The modern equivalent of the telegram is the telemessage, which if sent before 8pm is delivered by first post the following day (except Sunday). Originally designed for people to phone their message via the operator, the service costs £3.50 for 50 words. Now it's available via MicroLink – and costs only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are ... home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, tele-messages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 10.5p per minute or part – standard rate.

Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.

Applicable for storage of information, such a telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.

Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2p per minute or part (300 baud); 2.5p per minute or part (1200/75 baud).

Only applies to users outside the 01- London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 16.5p per 100 (N. America); £1.15 per 400 (Rest of world); £2.75 per 400 (Ships at sea).

Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Radiopaging: No charge.

If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

MicroLink

in association with

TELECOM GOLD*

Application Form

I/We hereby apply to join MicroLink

(✓) ☐ I enclose my cheque for £5 payable to Database Publications as registration fee to MicroLink.

(✓) ☐ I also wish to use Telex. I authorise you to charge an additional £10 to my initial bill for validation.

☐ I confirm that I am over 18 years of age.

Signature ______________________

Date ______________________

I intend to use the following computer ______________________

FOR OFFICE USE ONLY:

Mailbox assigned ______________________

Start date ______________________

Password ______________________

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Hazel Grove
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Company ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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Postcode ☐☐☐☐☐☐☐ Daytime telephone ☐☐☐☐☐☐☐☐☐☐

Commencement of Service
Please indicate month of commencement ☐☐ 19 ☐☐
Allow 10 days for validation of mailbox

Payment
Whilst Database Publications Ltd is the supplier of all the services to you, the commission and billing thereof will be handled by Telecom Gold as agents for Database Publications Ltd. Date of first payment to be on 15th of month following commencement.
Please complete billing authorisation form A, B or C below:

A. Direct Debiting Mandate *(Enter full postal address of Bank Branch)*

To ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐
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I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD by Direct Debit. Bills are issued 10 days before debit is processed.

Name of Account to be debited ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Account Number ☐☐☐☐☐☐☐☐

B. Please debit my/our Access/Visa account number ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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C. Please invoice the company/authority.

(✓) ☐ If you select this option, which is ONLY AVAILABLE to government establishments and public limited companies, you will be sent an authorisation form for completion which will require an official order number to accept unspecified amounts.

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MUSHROOMS GAME IS MAGIC!

LADDERS-and-levels games tend to be perennial favourites with most computer gamers. But you will usually find that having mastered the first few screens your progress becomes a little slow.

Wouldn't it be nice to remove a few of the offending monsters, or even re-design the screen completely?

Magic Mushrooms, from Acornsoft, allows you to do just that.

Those of you who remember Monsters, one of the first games released by Acornsoft, will find the game vaguely familiar.

The mutant tomato monsters are back with a vengeance, and the levels are constructed from the same green brickwork.

However, the rest of the game proves that the past few years experience have not been wasted.

No longer are the levels wholly constructed of nice solid brickwork. You will need to negotiate conveyor belts, escalators, ice, trampolines, and disintegrating floors.

The hero of the game is a chap named Murphy, a decidedly shady-looking character with a broken nose and a striped jumper. His job is to travel around the screen collecting the magic mushrooms. Then having collected every one, he has to head for the chequered flag.

Contact with the flag causes him to be transported to the next screen. The game consists of nine screens of increasing complexity.

As I mentioned earlier, you can create your own screens, or even modify those provided and save them to tape or disc.

They can then be reloaded in preference to the standard ones. Editing is really a very simple process. Each of the game's 15 features is displayed as a different design of block representing the different types of platform or monster.

Using the cursor keys, you can place the blocks anywhere on the screen, making it as easy or difficult as necessary.

Having designed a layout pressing the Tab key enables you to have a dry run on your new creation before finalising the design.

Magic Mushrooms is an excellent game, and with the flexibility of do-it-yourself screens it should outlive every ladders-and-levels game on the market.

James Riddell

AND THIS ONE IS SUPER, TOO

IN **Alien-8,** the latest release from Ultimate, you play the part of a small droid who wanders through a starship.

You must try to save the cryonauts by maintaining the cryogenic chambers before collision with the new colonisation planet occurs. All the time, of course, you're under attack from alien life forms.

The game takes place on a large 128-room, 3D maze set out in the form of a spaceship – according to the map I managed to produce, anyway.

It contains various aliens such as clockwork mice, Dalek-type creatures and some nifty remote-controlled robots for removing obstacles – my favourite feature.

You start in one of the four randomly-selected areas of the ship. One location is central, the other three are in the ship's corners.

Exploration of the maze is tricky, with most rooms requiring skilful timing and manipulation of movement keys before they can be traversed, or objects within them taken or restored to their rightful place.

Many traps are set and the first few hours of play are spent learning where these are.

The collected objects are then placed on flashing objects of the same shape to activate the cryogenic chambers to save the crew members.

It is most advisable to make a map to give an overall perspective of where you are going and to show which rooms are pointless to visit, so saving valuable time.

Graphically the game is superb and nicely drawn in 3D.

The animation is smooth but can get very slow at times. Sound is adequate but unimpressive and the movement keys are fairly well situated but, unfortunately, not redefinable.

There is no provision for joysticks.

Inevitable comparisons will be drawn with Knightlore – Ultimate's other release – as superficially the two look the same.

I found this game a lot more interesting and playable, though slightly slower.

Whether you have Knightlore or not, Alien 8 is a must for the collection. It is light years ahead of most BBC Micro games software.

Peter Clifton

Learning is made fun ...

ADDITION FUN from Shiva provides a set of five superb programs for five-to-eight-year-olds to practise and test addition and subtraction of numbers from 0 to 10.

Cats on the Wall is a two player game in which a line of 10 cats appears. Above them are arrows flashing at a selected speed.

A number appears and a key must be pressed when the number of flashing arrows corresponds to the number shown. If the key is pressed at the right moment, that number of cats disappears. If a mistake is made the micro responds with 'too many cats' or 'too few cats'.

The first player to knock all the cats off the wall is the winner.

Olly the Octopus is an addition game in which the players have to make the spots on Olly's tentacles add up to 10. Each player takes turns to assign a number of spots to one of their tentacles by pressing the space bar when the required tentacle is lit up. When a tentacle has the required 10 spots it turns yellow.

Picture is a simple but very effective number testing program. A display of boxes – each with a pair of numerals – appears on the screen in a 3 x 4 rectangle. Two further boxes appear with a number of dots on them like dominoes.

The pairs of numerals light up in turn and the player has to press the Spacebar when the illuminated pair matches the number of dots in the two boxes at the bottom of the screen.

Getting to the Moon involves addition and subtraction for two players. A rocket appears with six spacemen on each side and the numbers from one to five above them and a negation box.

Each player has one side of

→

Ingenious...

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From Page 73

the screen and must do a sum and subtract the result from 10.

A moving arrow is stopped at the spaceman whose number gives the correct answer to the sum. If the arrow is stopped correctly the spaceman moves across into the rocket ready for take off. If a player makes a mistake the micro responds accordingly.

The final program – Attack the Castle – involves addition and subtraction for two players. Each has two ladders going up a castle wall, one with a +1 at the top and the other with a −1. The rungs of the ladder are numbered one to 10 and the aim is to be first to the top.

A number appears in the castle gate, and if a four appears in the gate the player can either move 4 + 1 rungs up the +1 ladder, or 4 − 1 rungs up the −1 ladder. The top rung must be reached by exactly the right number.

The first player to get both soldiers right to the top is the winner.

This collection is of the highest quality. Most of the ideas behind the programs are simple but are beautifully presented and thoughtfully designed. Programs of this standard can be unqualifyingly recommended for any primary school use or home user.

Jane Jackson

Atic Atac – fast and furious

THE great oak door slams shut behind you and the lock clicks home. Soon the creatures of the night will rise, and then you're for it . . .

So begins **Atic Atac,** from Ultimate.

You are trapped in a five-storey castle, and your only hope of escape is to find the golden key.

Before the game starts, you must decide what type of character you want your hero to be. The choice is between a knight, a serf, and a wizard.

Each is armed with a different type of weapon and moves at a different speed. They also have their own specific type of secret passage.

The serf can vanish through the large beer barrels and the wizard can dive through what appears to be a piano.

Access between the five levels is via stairs which must be climbed, and trapdoors which can be fallen through.

Locating the golden key is difficult enough, but when you have to avoid every evil thing under the sun, you've got problems.

The bad guys materialise constantly in every room and come in a variety of guises.

The majority of these can be despatched with one hit from your weapon.

Unfortunately, the real meanies, such as skeletons and mummies, cannot be killed.

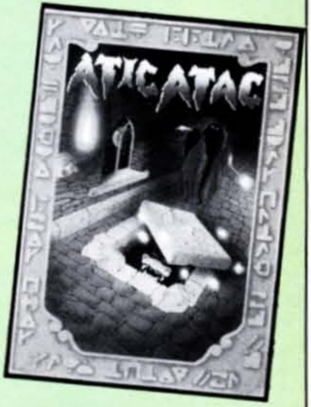
Bump into one of these super-spooks and you are likely to be minus one hero.

Though each character carries a different weapon, the method of use is always the same. Each time the weapon is used it richochets backwards and forwards along its line of fire.

I would recommend that you keep your finger on the fire button at all times – it's the only way to keep the numbers of spooks to a reasonable level.

The game is a race against time – the time remaining indicated by a picture of a cooked chicken. As time passes the chicken is slowly devoured, revealing more of the skeleton.

By consuming food and drink, which can be found around the castle, the chicken can be re-built.



Atic Atac is fast, furious, and fun – and at last Ultimate have provided a joystick option to one of their games.

Jon Revis

A check on your cheques..

DIAMANT Software's **Bank,** available on disc or cassette, aims to provide a tool for those who can't keep their financial house in order.

Having this disability to an

→

Save a damsel in distress

IN **Shanghai,** from Software Express, you have to rescue your fiancée, who has, for some unknown reason, been kidnapped and is being held on the top floor of an old shanty in Shanghai.

You must climb a series of ladders to reach her – and yes, it's another levels game.

To rescue your "Maid Marian", you must open the cage she is in with the key. This can only be held for a short time, so you must plan your route beforehand.

Pestering you all the time are the local meanies, who are shaped like furry footballs.

One of two ways to get rid of these furry menaces is to use the sword and stab your enemy through the stomach to collect a bonus. You can hold one item at any time and once again time is limited with the sword.

So if it suddenly disappears when you're right beside an enemy, say your prayers or be prepared to do the 100-metre dash.

The second way of getting rid of your enemies is by using the stick of dynamite.

Once the dynamite is lit, a timer appears at the top left of the screen. Drop the dynamite on the level you want – and when the timer runs out, everything on that level will be destroyed.

After you have opened the cage with the key, you must lead your girlfriend down to the tree – and guess where it is? Right down at the bottom level where you started.

On top of all this, you must

SHANGHAI
FOR BBC B & ELECTRON
software express

overcome another hurdle in the shape of the guardian – the ultimate meanie in this game. Until you unlock the cage he is asleep, but when he wakes you've got trouble.

He moves twice as fast as you and three times faster than your girlfriend, so you must grab the sword quickly and show him what you are made of. But it will take more than one stabbing to kill him.

The graphics are average and the sound is similar. It is, however, a fairly original idea.

All the usual features are available and although no joystick can be used you may choose your own keys with which to play.

Shanghai will take time to complete and, if you are patient and enjoy levels games, of which this is an an above-average example, this is one for you.

Simon Rubins

From Page 75

extreme degree, I'm exceptionally well qualified to judge it.

The program will keep a record of your bank transactions over a period of 12 months, together with a running balance, and will even print professional-looking bank statements.

Provided that you diligently enter all deposits and outgoings, the information you get will be more up-to-date than anything from your real bank, and you can make it as detailed as you wish.

Up to 50 standing orders – income or expenditure – can be handled automatically, whether they occur annually, monthly or at irregular intervals.

The statements you send to yourself list all such payments, and inform you of those due over the next seven days.

For non-recurring transactions, you simply enter dates, items details, and amounts.

Unfortunately, the screen instructions make the program unnecessarily difficult for new users.

The less mathematically minded may well be puzzled by prompts such as "+ve for input, -ve for withdrawal"; and the ambiguity of "Type numbers only when entering sums" could leave some people in the dark.

More serious is that there is insufficient error-trapping.

It is possible to lose data, to exit from the program accidentally, and to make it hang.

There is no escape route, for instance, if you fill the printer buffer with no printer attached.

Or again, Bank thinks that a lower-case "y" for YES means NO, which can give some strange results. I would have thought that disposing of that particular old chestnut would not have been too much to ask.

Nevertheless, when you get accustomed to its quirks, the program can be useful.

Quite apart from the fact that – I'm told – it's worth checking for mistakes made by bank clerks, for most of us the only way to avoid bank charges is always to know precisely where we're up to.

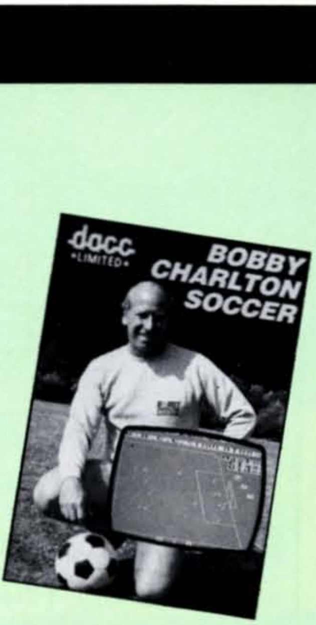
And here, unless you're genuinely on your uppers, the program does help.

Bank is not especially ingenious or revolutionary, but if it were tidied up, and if the documentation looked less "home-made", it would not be out of place in a good software library.

Even as it stands, it's probably worth buying if you're anything like me.

Gabriel Jacobs

Kick-off time!



THE "in thing" for computer and software houses at the moment seems to be sport simulation games.

Bobby Charlton Soccer, from DACC, is an excellent and addictive game which allows you to actually play the game as well as setting up the skill, stamina and accuracy levels of your players and special team formations.

After completing the Manager module, you enter the match proper in which you can play against the computer or against other players.

The screen displays a TV camera's view of the football pitch, and keyboard or joystick control can be alternated between the two players closest to the ball with the computer moving the rest of your team with the flow of play.

The players are a little on the small side, but their movement is very responsive and smooth.

The length and direction of a kick is also fully under your control.

All the normal rules of soccer apply, with goal-kicks, throw-ins, corners, and so on, and the teams change ends at half-time.

Any goals are greeted with an enthusiastic roar from the crowd.

When the game finishes, a fresh game starts after a couple of minutes.

There is a facility to watch a demonstration game and this has a nice feature whereby you can, at any time, take control of either side and become involved in the game.

Several options at the start of the program allow you to set up a new game. They include such choices as one or two players, whether random injuries are to be included, and length of playing time each way – between three and 45 minutes.

The second side of the tape contains a helpful introduction from Bobby Charlton which is well worth listening to before you start playing.

One small criticism is that I would like to have seen a facility to move this program to disc as the loading time is about seven

Playbox is super for kids

PLAYBOX, from Comsoft, is a superb tape, containing three separate programs which will be a valuable and popular addition in many schools and homes.

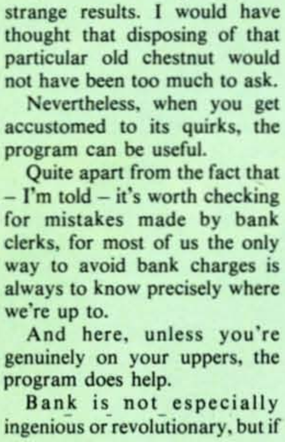
I would certainly have spent my money on it if it had only two of the three games – the third is the icing on the cake!

Hangman must have been played in every home and school as it's a superb way of stimulating young children to think about their spelling vocabularies without it ever appearing to be work.

The trouble with some implementations I've seen for micros is that the graphics tend to either be very poor or to emphasise the gory ending of the game.

Here the graphics are bold, colourful and friendly – not even the youngest child would be frightened by them.

There are a variety of vocabularies built into the program, sorted either by age or by subject category.



There is also a most useful option, in which the teacher could input words for the child – perhaps related to a reading scheme or current topic – or two or more children could try to outwit each other.

Although many educationalists frown on competition, children revel in it and the competitive angle is a strong stimulus for some.

The second game is called Memory and is a version of the old but enjoyable game of pairs, played with playing cards.

Here two children play against each other, turning over two cards to reveal pictures and shapes.

When a pair is matched, that child scores a point, the cards are left revealed and the game continues.

The methods of entering the chosen cards is simple and fairly young children will soon grasp the idea.

Although the graphics are less impressive than in Hangman, they are quite presentable and clear.

Phil Tayler

minutes. However, this did not deter me from playing whenever I had a spare half-hour and I was soon able to beat the computer and any unsuspecting friends that called in.

I look forward to seeing the promised World Cup and Canon League modules.

Alan Cockman

Now–VROOM...

KEMPSTON, the company known mainly for joysticks, has brought out **Chicane,** a Formula 2 motor-racing simulation game with intelligent opponents, realistic spinning and gear-changes, superb 3D effects and six different circuits.

While the game is loading you are presented with the cockpit view to the front of your car, complete with working rear mirrors, scenery backdrop and the option to select one of the six race circuits.

Once you have made your choice of circuits you are ready to qualify, given one lap to gain the qualifying time for the three-lap race.

The racetrack is lined with countdown and direction signs to show the distance and direction of approaching bends.

All this looks and sounds quite impressive. However, all that glistens is not gold.

The game takes place on a smaller redefined Mode 2 screen. This provides more colours for less memory, but gives the game a squashed feel.

CHICANE
KEMPSTON MICRO
RACING GAME

The scrolling of the track, scenery, and even the instruction prompts are far from smooth.

This poor scrolling got so bad that I found it almost impossible to read the direction signs while racing flat out.

On the plus side, sound is quite good, the opponents quite intelligent, and while racing, if you are in first position, no cars mysteriously appear in front of you as in other games.

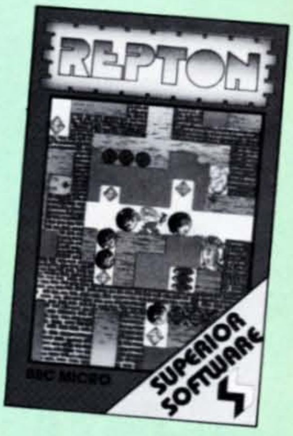
Overall, the package is let down by the programmer's trying to make too much happen on too small a screen.

The result is a game that looks pretty but has no lasting playability. I found it far from the simulation the manufacturers claim it to be.

To top it all, the game has unfortunately been released at the same time as Revs, which, despite being twice the price with only one track, is immeasurably superior in almost every respect.

Peter Clifton

Repton is a sparkler



REPTON is the latest, and claimed to be the best release from Superior Software.

In short, it is.

It's one of those arcade-style adventure games in which you play the part of the hero, Repton.

His mission is to retrieve all the diamonds from a series of twisting underground caves.

Unfortunately the caverns are also full of precariously balanced rocks that tend to drop on you if you dig under them.

They are often arranged so that if you loosen some before others, they fall in the wrong order and seal off the passage to certain diamonds forever.

In later caverns the diamonds lie underneath giant eggs which fall and hatch into ferocious reptiles when you take the diamond. Needless to say, they then spend all their time chasing after you.

In even later caverns you have to open a safe using a special key that you must find.

Now for the technical side.

The entire screen acts as a window on to the area of the cavern you're in, so that you can

→

Chat with your micro

I FREQUENTLY find myself talking to my micro and rarely does it answer back. When it does, it's likely to be those unhelpful "Failed at line so and so ..." or "Missing". Occasionally, it's so cheerful it calls me silly!

Talkback, from Acornsoft, is what I've been waiting for. At last I've the chance to have an intellectual conversation with the computer.

At least I can pretend to be intellectual.

The program allows you to hold conversations between characters that you've developed yourself.

The personalities of the people created are determined by a series of Keywords, Responses and Starters for each character.

The conversations are generated from a collection of Keywords and Responses.

If a Keyword is mentioned then the Response is made.

Good dialogues are created by developing several Responses to a single Keyword and through making one character's Responses contain Keywords of the other character.

You can watch, printout or even join in the conversations on the screen.

Characters can be saved at any stage and reloaded for further development later.

This package is both a home entertainment program and an educational tool.

Conversations can be created by experimentation and the use of novel language. They can develop from careful attention to the structure of language to achieve controlled results. Either way the results are very impressive.

The program is available on disc and tape, for both the Electron and BBC computers.

With it is a comprehensive manual that describes the techniques for developing conversations.

With practice those techniques can be applied to both real and imagined situations.

Possibilities include dialogue drawn from life – interviews, complaints, proposals and such like.

The manual suggests many more imaginative dialogues including a car and a horse, stomach and mouth, or a close encounter with an alien.

The whole program is menu driven – pressing Escape always returns you to the Choice Page.

Within the options are creating, altering, saving and loading characters.

Two characters are included with the program – they're Astro and Bomb inspired by the concluding part of the film Dark Star. By running their conversations and joining in with them the techniques and potential of the program can be more easily seen.

I can thoroughly recommend this program. I've ordered a copy for my own classroom as I'm certain of its educational value. I'm equally certain that it can be an entertaining program for the home.

John Woollard

From Page 77

only see a sixteenth of it.

As you move, the view through the window scrolls very smoothly in the appropriate direction.

Repton is a colourful green-headed character and is beautifully animated. If you don't move him, he starts looking round of his own accord . . .

Not to be outdone, the reptiles strike a fearsome pose with their webbed feet and yellow bellies.

The sound is optional but well implemented even so, featuring a continually-playing tune plus plenty of blips and blasts.

At any time during play you can look at a map of the entire cavern to see where the remaining diamonds are.

After completing each screen you are given a password enabling you to skip that screen in future.

There are 12 caverns in total, getting progressively harder.

All in all, this is an astounding game reaching new heights in BBC arcade adventures. So if you fancy yourself as Indiana Jones, go out and buy it today!

Phil Tudor

THIS WAY, MATHS IS FASCINATING

AS a youngster I played for hours with a fascinating game which used a set of coloured wood shapes that could be placed on a board to form a variety of geometical patterns.

Maths With a Story, from BBC Soft, uses similar techniques to teach primary school children basic pattern recognition.

Primary school did I say? I found this tape as fascinating as my bits of wood all those years ago.

Learning to recognise shape, pattern and symmetry are important stages in the development of spatial awareness in young children.

When this learning is combined with exercises in logical thought, one has a basic teaching package which introduces young children to the first stages in design, problem-solving and basic mathematical skills.

The tape comprises four programs: Jigsaw, Pattern, Twodice and Colour.

Jigsaw allows a pupil to design a square pattern of interlocking coloured shapes. The program then splits this pattern into nine smaller squares and shuffles them into random positions within the large square.

The pupil then solves the puzzle by using the coordinates of the blocks to instruct the computer which block to move and where.

Pattern is a program which introduces pupils to the world of symmetry and reflection.

I found this game particularly fascinating – rather like making a doyley by folding a piece of paper, cutting shapes from it, opening it out and obtaining a symmetrically-shaped cutout pattern.

The program splits the screen into halves or quarters and when the pupil draws a pattern within one portion of the screen the program repeats the pattern as a reflection in the other portions.

Twodice is rather different from the other programs in that it is a simulated dice game in which up to four pupils can race each other up a lift.

Colour introduces pupils to that well-known mathematical classic, the map-colouring problem.

The program generates patterns and pupils then guess the minimum number of colours required for each pattern without colour overlap.

When the number of colours have been entered, pupils colour the pattern to see if they guessed correctly.

The colour fill routine used is fast and fascinating to watch.

The unusual and attractive sound and graphics used in all the programs hold your interest and this, plus an excellent user manual and screen instructions, adds up to one of the best educational packages I have seen.

John Daddy

It's really as easy as ABC!

ABC, by Acornsoft, is quite simply one of the easiest disc-based word processors I have used on the BBC Micro.

It isn't the one with the most features, many of which will not be of much practical use to the home computer owner anyway, but merely the one which seems to introduce the basic ideas of word processing in the simplest and most easily understood manner I have come across.

There are two main methods of entering text, one being called "Write", and looking for all the world like a piece of lined writing paper.

The green writing on black paper is both pleasing and easy on the eye, and the automatic word-wrapping makes the entry of writing straightforward.

Ten lines of text are visible at a time, although scrolling facilities are present.

The second style is termed "Read and Write", and resembles just four lines of the same lined paper, with a "slate" available above.

This slate is normally used for a display of any 11 lines of the current text, which can be easily scrolled up or down. Its more unusual use is as a scratchpad, when ideas or problems can be jotted down.

Once information is written into the slate, the normal display may again by shown, but at any future time it is still possible to access the jotted information.

There is also a facility to view text in double-height characters, although sadly schools will not be able to exploit this fully as there is no method of editing or entering text while displaying in this way.

The print menu is reasonably comprehensive, with options to print blank lines between the text lines, and to print if required in a 35 column mode, so that the text is printed exactly as on the screen.

There is also a rather handy facility which ensures that odd lines, called "lonely lines" in the documentation, do not become stranded at the bottom of a printed page.

This helps to ensure that first lines of paragraphs, or title lines do not find themselves oddly removed from their context. Right justification can also be introduced at the printing stage, although this cannot be shown on screen.

So far I have had little but praise for the program, and quite rightly so, with its wide range of facilities including word search/replace and block moves.

However, there are a couple of drawbacks, neither particularly vital.

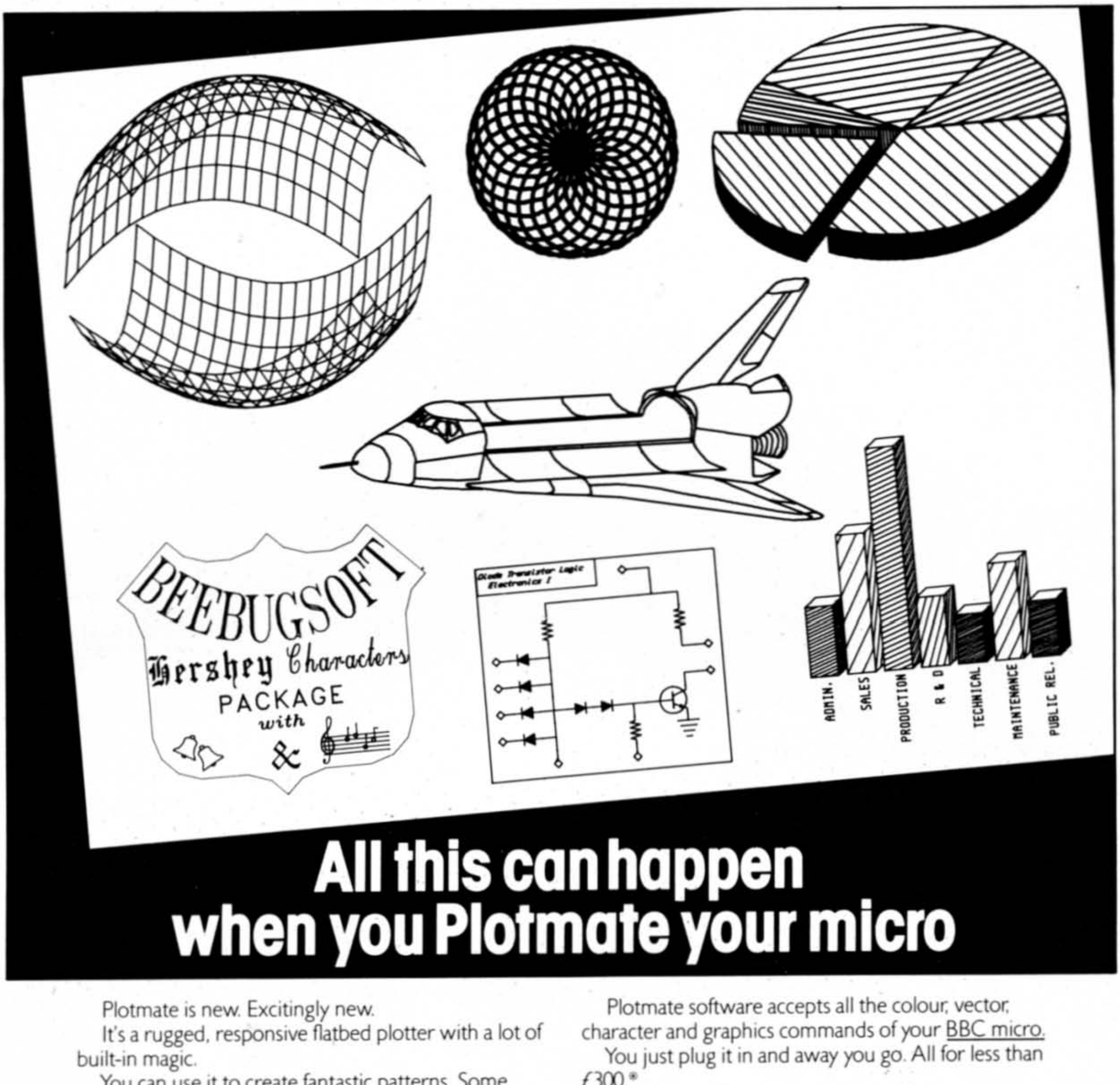
Firstly, the length of text allowed for would handle a modest document of about 900 words, but even the home user might like to know the word count for certain applications.

Secondly, there is no flexibility in screen column display, but this reflects the fact that many owners will be trying this program on their televisions, and 80 column text is then usually useless. Obviously the printer can be made to print in up to 80 columns.

Otherwise, Acornsoft have aimed beautifully at the small home user, with a useful option to switch at will between tape and disc for loading and saving files. Owners of View can use a utility program included on the disc to convert an ABC file for use on View.

For £9.95 on cassette and £11.50 on disc it contains as many features as you need, and is remarkable value.

Phil Tayler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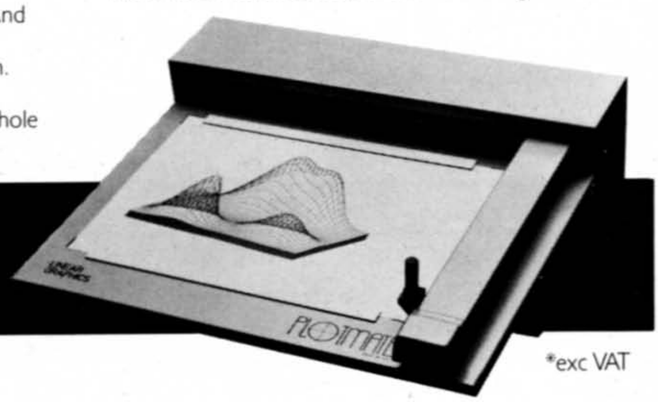
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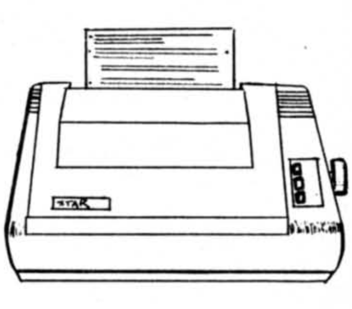

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GET YOUR MES

Give your messages impact with this scrolling program by MICHAEL MITCHELL

YOU may have seen at computer shows BBC Micros being used as scrolling message boards. That is, an advert of some kind scrolls from the right of the screen, and moves smoothly over to the left-hand side, where it disappears.

A brilliant example of this technique is Acornsoft's Snapper/Hopper demo which runs around the monitors above their stand.

The program I describe here – for Basic II only – allows a similar effect. But it is limited to one computer – not eight like the Acornsoft demo. And it can only scroll text, not graphics – though user-defined characters can be used.

The scrolling message board is great for attracting attention in shop windows, or at computer club meetings. So, rather than just present a simple program that does the job adequately, I decided to write a program which has many versatile features, and which can be made even better by readers interested in doing so.

The main part of this article describes the use of the program. The listing documents how it works.

The scrolling message consists of text characters from the normal BBC character set. If you have defined your own graphics characters, they can be used, too. The message is scrolled on to the screen between a top and bottom border.

MODE	Pixels per byte	characters per byte
0	8	1
1	4	half
2	2	quarter
3	8	1
4	8	1
5	4	half
6	8	1

Figure I: Width of each screen byte in pixels

There are eight characteristics, or attributes as I've called them in the program, that you can control. These are:

0	Top border colour	TBC
1	Text foreground colour	BGC
2	Text background colour	FGC
3	Bottom border colour	BBC
4	Top border height	TBH
5	Text height	CHH
6	Text width	CHW
7	Bottom border height	

I've labelled the attributes from zero as this is how the program refers to them. The three-letter mnemonics are variables defined in the program which are used in commands.

The colour attributes are not the usual number given in COLOUR and GCOL statements. Instead, they are byte values which are stored on the screen. I'll talk about the interpretation of these bytes for different modes a bit later.

The height attributes are in terms of vertical pixels. The message program is designed to work only in the graphics modes – though it works after a fashion in Mode 3 and 6 – so there are always 256 pixels horizontally.

Typical values for the top border height and the character height are 64 and 8. This means that the top border occupies the top quarter of the screen, and the text occupies the next 64 lines – as each of the eight rows in a character occupies eight pixels vertically.

The bottom border height is not given explicitly, but is 256 minus the sum of the other two heights.

The character width is the width in bytes on the screen of each of the eight columns in a character definition. Thus with the minimum value of 1 for character width, each character scrolled on to the screen is eight bytes wide. The actual width of a byte depends on the mode – see Figure I.

So, if you set character width to 2 in Mode 2, each character will be 2*8=16 bytes wide, which is 32 pixels or 4 normal character widths.

The seven attributes (TBC to CHW) are programmed through a set of commands embedded in the message to be displayed. If you just want to scroll the text:

```
Buy Micro User Monthly
```

then all that is required is the statement:

```
EQUS "Buy Micro User Monthly"+CHR$0
```

at the end of the listing after the label *.strBuffer*. However, the message will be in boring black-and-white, with constant-height characters, and will only be displayed once.

To make it more interesting, we use the commands described in Table I to alter the attributes' values.

There are 17 commands that the program understands. They are given the Ascii values 0-16, so are like control codes. They may be followed by zero, one or two parameter bytes.

Some of these are a little esoteric, so we'll restrict ourselves to commands 0 to 10 and 15 for now. For each of the commands, the program defines a function which can be used in an EQUS in the asssembly listing. To give a concrete example, suppose we want to

SAGE ACROSS

print "Hello", then "There" a bit higher up but in bigger letters. We might use this:

```
.strBuffer
EQUS "Hello "           Simple text
EQUS FNadd(TBH,256-32)  Use add to
                        decrement TBH
                        by 32
EQUS FNadd(CHH,4)       Use add to
                        increment CHH
                        by 4
EQUS "There"            Straight text
                        again, albeit
                        higher up and
                        taller
EQUS FNret              Return
```

```
.strBuffer
EQUS FNrst(TBH)         Make sure
                        they start
                        off at
                        default
                        values
EQUS FNrst(CHH)
EQUS "Hello "           Simple text
EQUS FNadd(TBH,256-32)  Use add to
                        decrement TBH
                        by 32
EQUS FNadd(CHH,4)       Use add to
                        increment CHH
                        by 4
EQUS "There"            Straight text
                        again, albeit
                        higher up and
                        taller
EQUS FNgoto(strBuffer)  Go back to
                        the beginning
```

Note the way in which you can perform subtraction from an attribute by adding 256 minus the number to be subtracted. Suppose we want to print the text repeatedly, the listing above could be used.

The extra instructions are a couple of RSTs to make sure that the heights are restored each time round. The GOTO causes a jump to the beginning. Therefore, RET is not needed because the routine is tied up in an infinite loop.

What about colours? This is a little tricky, as the value given when a colour attribute is set is not a COLOUR or GCOL-type colour, but a value which is actually stored on the screen. There may be eight, four or two pixels in a byte, as shown in Figure I.

In the two-colour modes – eight pixels per byte – the correspondence between the byte stored and the bits on the screen affected is straightforward. Each bit stands for one pixel, bit 7 being the leftmost, bit 0 the rightmost.

So, to get a striped pattern with two pixels on, two pixels off, we want binary 11001100, which is &CC in hex. Assuming we're in Mode 4 or 0, to print "Sale now!" in striped text, this would be used:

```
.strBuffer
EQUS FNset(FGC,&CC)     Set the
                        foreground
                        colour
EQUS "Sale now!"        Do the text
EQUS FNgoto(strBuffer)  Repeat
```

FGC is foreground colour. We could be really freaky and make the

0	ret	End of message or subroutine
1	set attr,val	Set attribute to val
2	rst attr	Reset attribute to its default value
3	add attr,val	Add val to attribute
4	inc attr	Add one to attribute
5	dec attr	Subtract one from attribute
6	ror attr,val	Rotate right attribute val places
7	rorl attr	Rotate right attribute by one place
8	roll attr	Rotate left attribute by one place
9	eor attr,val	Exclusive-OR attribute with val
10	inv attr	Invert the value of attribute
11	for count	Do the following text count times (1-256)
12	next	End of the most recent FOR
13	jsr addr	Execute a substring at address addr
14	post addr	Set the post character routine address
15	goto	Goto a given address in the string
16	get	Get a character from the keyboard and scroll it

Table I: Commands to alter the display attributes

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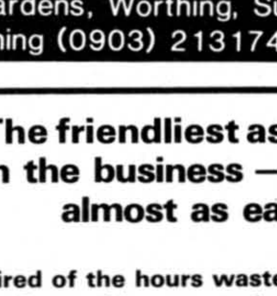
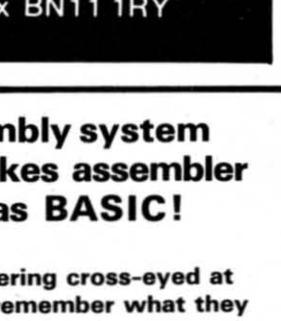


```
 PC   A  X  Y  SP  NVBDIZC  STACK  I
0000 00 00 00  FF  0000000  00 00 00 00
0000 00 00 00  FF  0000000  00 00 00 00
-----------------------------------------
    .IOVESP
   4C50    BIT SPILL-1
   4C60    BPL GOODMATCH
   4C62    JMP (STARTVEC)
    .GOODMATCH
   4C65    LDY INDEX
   4C68    LDX #0C
    .NEWSTORE
   4C6A    LDA (STOPFEED),Y
   4C6D    STA SPILL,X
   4C70    DEX
   4C71    DEY
   4C72    BPL NEWSTORE
    .INLAN
MP 4C74    JSR TUBEFIND
   4C77    BEQ HIRAM
   4C79    LDA #>ROUTBRK
   4C7B    STA RBRKVEC
-----------------------------------------
>JSR TUBEFIND
```

Debugging Screen



```
 PC   A  X  Y  SP  NVBDIZC  STACK
4C74 00 FF 00  FF  1010001  02 45 00 00
4500 00 FF 00  FF  1010000  00 00 00 00
-----------------------------------------
    .IOVESP
   4C50    BIT SPILL-1
   4C60    BPL GOODMATCH
   4C63    JMP (STARTVEC)
    .GOODMATCH
   4C65    LDY INDEX
   4C68    LDX #0C
    .NEWSTORE
   4C6A    LDA (STOPFEED),Y
   4C6D    STA SPILL,X
   4C70    DEX
   4C71    DEY
   4C72    BPL NEWSTORE
    .INLAN
MP 4C74    JSR TUBEFIND
   4C77    BEQ HIRAM
   4C79    LDA #21
   4C9B    STA RBRKVEC
-----------------------------------------
>SC INLAN
```

20·13

From Page 83

background the "opposite" stripe: 00110011 or &33:

```
.strBuffer
EQUS FNset(FGC,&CC)
EQUS FNset(BGC,&33)
EQUS "Sale now!"
EQUS FNgoto(strBuffer)
```

In the four-colour modes, the relationship between bits in the byte and the pixels is a little more complex – see Figure II – where 0 is the leftmost pixel on the screen.

So, if we want even pixels in colour 2 and odd pixels in colour 1, we need a byte in binary: 10100101 or &A5. In the simple case where all pixels are the same colour, say *c*, then the value to be stored is:

```
15*(c AND 1) + 120*(c AND 2)
```

which for colours 0, 1, 2 and 3 is 0, &0F, &F0 and &FF respectively.

In Mode 2 there are four bits in each pixel, with the following bit-pixel correspondence – see Figure III.

As an example, if pixel zero is to be colour 5 (0101) and pixel 1 is to be colour 13 (1101) then the byte value is 01110011 or &73.

The rotate and EOR-type operations are probably more useful than add-type ones when dealing with the colour attributes. For example, to print "Normal" (white on black text) followed by "Inverse" (black on white text) in a two-colour mode, this would be used:

```
.strBuffer
EQUS "Normal "          Print normal
EQUS FNinv(BGC)         Invert the colours
EQUS FNinv(FGC)
EQUS "Inverse "         Print inverse
EQUS FNinv(BGC)         Invert again to
                        get back to normal
EQUS FNinv(FGC)
EQUS FNgoto(strBuffer)
```

The second pair of *inv*s revert the colours to normal again. The listing below demonstrates the use of rotate right, in a four-colour mode:

```
.strBuffer
EQUS FNset(FGC,&A5)     Striped text
EQUS FNset(BGC,&5A)     Striped but
                        inverted
.£loop
EQUS "Ho "              Print text
EQUS FNror(FGC,4)       Shift the
                        colour bytes
                        by 4
EQUS FNror(BGC,4)
EQUS FNgoto(£loop)
```

I use the label *£loop* to avoid any clashes with labels in the program, none of which starts with £.

```
bit 0    pixel 3, bit 0
bit 1    pixel 2, bit 0
bit 2    pixel 1, bit 0
bit 3    pixel 0, bit 0
bit 4    pixel 3, bit 1
bit 5    pixel 2, bit 1
bit 6    pixel 1, bit 1
bit 7    pixel 0, bit 1
```

Figure II: Pixel/byte relationship for 4 colour modes.

```
bit 0    pixel 1,bit 0
bit 1    pixel 0,bit 0
bit 2    pixel 1,bit 1
bit 3    pixel 0,bit 1
bit 4    pixel 1,bit 2
bit 5    pixel 0,bit 2
bit 6    pixel 1,bit 3
bit 7    pixel 0,bit 3
```

Figure III: Pixel/byte relationship for Mode 2

We have now seen the basic elements of the string "language". What about the more complex parts, like FOR and JSR? These have counterparts in Basic so shouldn't be that hard to grasp.

The *for* instruction is followed by a count. This is a single byte in the range 0-255, where 0 implies 256.

The form of a *for* loop is:

```
EQUS FNfor(10)
EQUS "This will be done ten times"
EQUS FNnext
```

Anything between *for* and its corresponding *next* will be executed 10 times. You can put commands such as *add* and *for* in a loop. *For*s may be nested to any depth.

In fact, the stack used to save return addresses is 50 bytes long. *For*s take three bytes, so there may be up to 50/3=18 nested *for*s if there are no *jsr*s. This should be enough.

Empty *for* loops may be nested to give suitable delays between words being scrolled on to the screen. For example, this gives about a four-second delay:

```
EQUS FNfor(0)         0 means 256 times
EQUS FNfor(230)
EQUS FNnext
EQUS FNnext
```

Note that this could be written as just one EQUS:

```
EQUS FNfor(0)+FNfor(230)+FNnext+FNnex
t
```

Each empty *for* loop iteration takes about 68 microseconds, which may be used for calculating other time delays.

If a delay like the one above was required several times in a program, it could be made into a subroutine. A subroutine is just a sequence of text or commands which can be called from anywhere in the string. It is terminated by a *ret*. For example:

```
.strBuffer
EQUS "One pause"          Print the text
EQUS FNjsr(£pause)        Call the pause
                          routine
EQUS "Another pause"      More text
EQUS FNjsr(£pause)        Another pause
EQUS "The end"            Final text
EQUS FNret

.£pause                   The pause
                          subroutine
EQUS FNfor(0)+ FNfor(200)+ FNnext+ FN
next
EQUS FNret
```

Subroutines may also be used for common long words or phrases:

```
.strBuffer
EQUS FNjsr(£sale)
EQUS "27128s only £6.99"
EQUS FNjsr(£sale)
EQUS "MEMC chips only £999.99"
EQUS FNjsr(£sale)
EQUS "Ask for a price list!"
EQUS FNgoto(strBuffer)

.£sale
EQUS " Great summer sale now on! "
EQUS FNjsr(£pause)
EQUS FNret
```

Subroutines take two bytes on the stack, so up to 50/2=25 subroutines may be nested if no *for*s are active.

The *get* command simply takes a character from the keyboard and scrolls it on to the screen. For example:

```
EQUS "Press some keys: "
EQUS FNfor(10)
EQUS FNget
EQUS FNnext
```

will scroll the prompt then print the next 10 characters typed at the keyboard.

The final feature of the display language is perhaps the most useful. The

→

From Page 85

post command sets the address of the "post character" routine.

This is a normal subroutine, but is called automatically after every character is printed – but not after control codes are executed.

For example, if you wanted to invert the colour of the top and bottom borders after every character, this could be used:

```
.strBuffer
EQUS FNpost(£post)      Set the
                        address of the
                        post routine
.£loop
EQUS "Freaky days are here again "
EQUS FNgoto(£loop)      Repeat

.£post
EQUS FNinv(TBC)+FNinv(BBC)
EQUS FNret
```

So, once the *post* command is executed, the subroutine at *£post* is called after each character is scrolled. To turn off the post character routine use:

```
EQUS FNpost(strBuffer-1)
```

You can probably think of many applications for the post character routine, such as changing colours dynamically, changing character sizes, border sizes and so on.

That concludes the discussion of the language as it stands at the moment. Suggestions for extra features are given after the brief program description.

To use the program, type or load it in. Unless you are using a 6502 second processor, you will have to use Mode 7 to actually assemble the code. Type in the desired program immediately after the label *.strBuffer*. Don't forget that unless the display loops – using GOTO – you will have to put

```
EQUS FNret
```

at the end. Save the source program and RUN it. This will create a file called *X.SCROLL*.

Now type NEW and go into the desired screen mode. Then type the command:

```
*RUN X.SCROLL
```

This will execute the scrolling program. If you want to escape at any time, press Escape followed by Ctrl+L.

Here's a brief program description. It's fairly straightforward, even though it's quite long.

The main loop gets a character. If it is zero, we are at the end of the string or a subroutine, so an *rts* is executed. If it is between 1 and the highest command code, the appropriate control routine is called. Otherwise, it is text and is printed.

The print routine gets the character definition using OSWORD 10. Each column of the definition is scrolled on *characterWidth* times. For each column, the top border is drawn, then the eight rows of the character – each row being repeated *characterHeight* times – then the bottom border.

The important pointers are *topOfScreen* which is the address of the byte displayed at the top left-hand corner of the screen, but divided by 8 as this is what the 6845 chip wants.

ScrAddr is the address of the top right-hand corner of the screen. It is here that poking on to the screen occurs. *CellAddr* starts off at *scrAddr,* but *bytesPerLine* is added to it every eight vertical pixels to get to the next character row.

After the character has been printed, the post character routine is called, but only if one is set. Note that the post character routine is disabled during this call, so that it doesn't get into an infinite loop.

The main tables are for the command addresses. Each entry contains the address minus one of the command routines, the attributes table, and the default attributes table.

If you add routines to the program, don't forget to update the command address table, and the entries in PROCconstants, and add the macro to use the command.

How can the program be improved? Firstly, we need a way of programming the palette. Combined with the post character routine, this could provide some quite bizarre effects. The code for a palette command would be:

```
.palette
   lda #19          Palette is VDU 19
   jsr oswrch
   jsr getChar      Get the logical
                    colour
   jsr oswrch
   jsr getChar      Get the physical
                    colour
   jsr oswrch
   lda #0           Now the three zeros
   jsr oswrch
   jsr oswrch
   jmp oswrch       and return
```

All you have to do is give it a command number – 17 is probably a good choice – and add the FNpal macro and command table entry to the program. It would have the form:

```
DEF FNpal(log,phys)=FNtwo(palC,log,ph
ys)
```

where *palC* is the command code.

Another useful function would be OSBYTE calls, so the flash rate could be changed from within the string:

```
.fx
   jsr getChar      Get contents of A
   pha              Save it
   jsr getAttr      Get contents of X
   jsr getChar      Get contents of Y
   tay
   pla              Restore A
   jmp osbyte       Execute it
```

The macro for this would be FNfx(a,x,y) and would plant a control code – say 18 – followed by the three bytes a,x,y.

Finally, a colour command could be incorporated to set one of the colour attributes in terms of the usual COLOUR number instead of having to mess about with filling bytes. This might have the form:

```
DEF FNcol(attr,col)=FNtwo(colC,attr,c
ol)
```

where *attr* is TBC, FGC, BGC or BBC, and *col* is 0 to 1, 3 or 15 depending on the mode. It could be coded:

```
.col
   jsr getAttrAndN  Attr in X, col
                    in A
   tay              Save col
   lda #17          COLOUR =
                    oswrch 17
   jsr oswrch
   tya              Get colour
                    number back
   jsr oswrch
   lda &357         foregroundByte
                    location
   sta attributes,X Get the byte
                    and save it
   rts
```

Here we are using the COLOUR command to work out the fill byte for the colour given, and then storing it in the attribute table.

As you can see, there's plenty of scope for improvement. You'll probably run out of memory before you run out of ideas. Maybe you should think about buying a second processor.

Complete listing starts on Page 134

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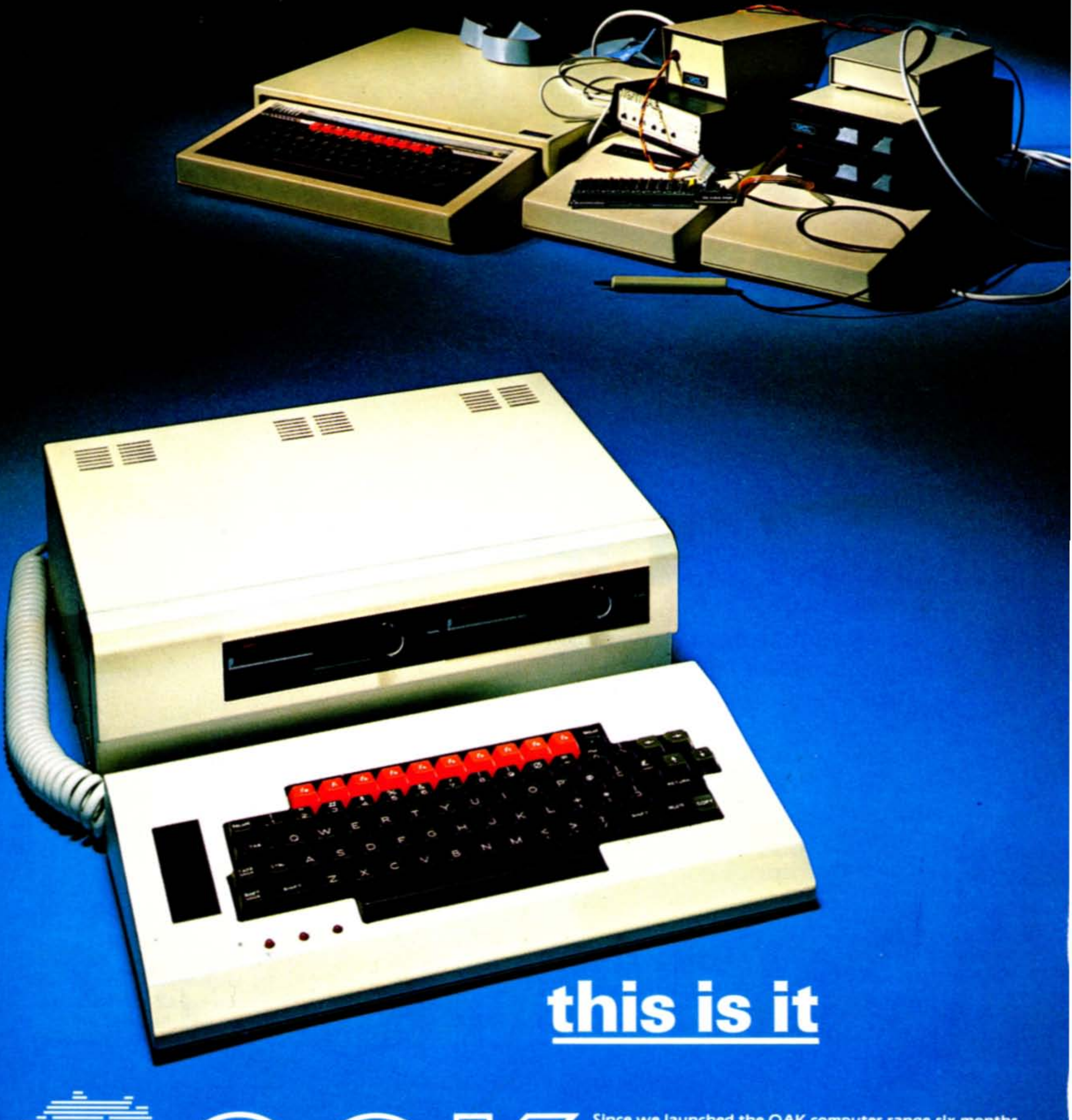

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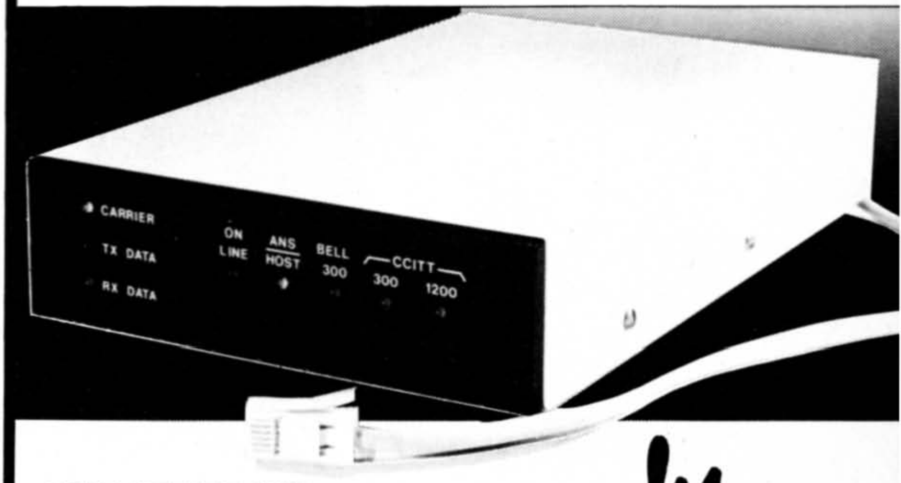

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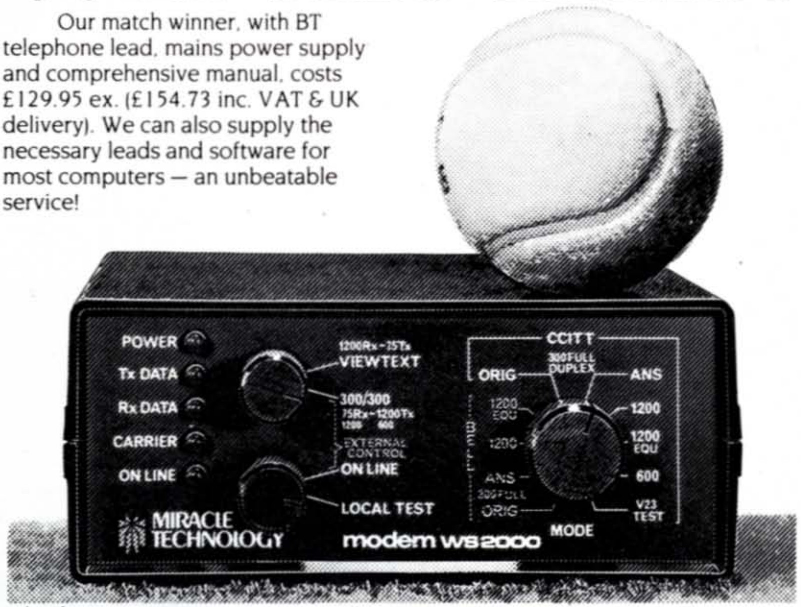

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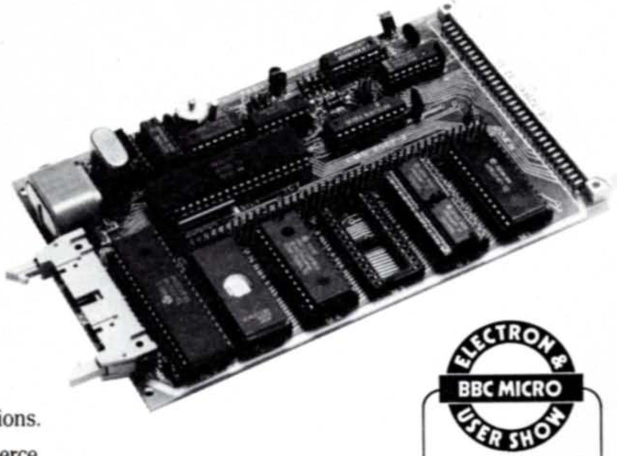

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BASIC ANALYSER

A FEW months ago a friend passed me a copy of a fairly lengthy program that he had typed in – from a well known magazine for nut-eaters – with a request that I sort out the bugs in it.

He assured me that he had checked his typing character by character against the published listing, and that it was all correct.

Eventually, after several late nights punctuated by remarks of increasing acidity from my wife – about "not being the only user of the micro", "not forgetting that some people might want to watch TV", and so on – I had tracked down five errors in program logic and three typing errors. I had also resolved never to do such a thing again.

But the problem was how to prevent such a situation – of a stubbornly bug-ridden program – arising in the future, or at the very least how to speed the bug-detection rate.

When working with other computers I have been accustomed to having full cross-reference listings available, which are produced by ever-helpful, though time consuming, compilers.

Certainly, I was made very aware of the lack of such a facility within BBC Basic. Thus were sown the seeds of the Basic analyser that I am going to describe.

As a start I wanted a program that would check the syntax of any Basic program, and that would give me more detailed error messages than does the Basic interpreter.

Next I wanted it to check that all variables, functions and procedures were both defined and used, thus trapping many typing errors. At the same time I wanted to have a check that any array dimensions or passed parameters were consistent in number and type, numeric or string.

I also wanted to be able to identify every place where a variable, and so on, was used within a program, and to be able to tell the context in which it was being used. This is particularly useful when extending or modifying a program.

I then felt that it would be useful to identify the origin and destination points of GOTOs and GOSUBs – the program that I debugged was a real knitted tangle of GOTOs and GOSUBs – and also to give a warning of any line number references that would not be RENUMBERed correctly.

As some of my previous programs have needed a considerable turn of speed, and knowing that this can be facilitated by a careful choice of variable names – distributing them evenly across the variable catalogue – the spread of entries that would be created in the Basic variable catalogue when a program runs would also be useful.

Last, but not least, I wanted it to check all VDU statements in a program for missing semi-colons or parameters, as I have found from bitter experience that this is a frequent source of trouble.

The resultant program, the Basic Analyser, does all of the above, to a greater or lesser extent. The checking of VDU statements is necessarily incomplete, and, for reasons of space, the checking of parameters passed to system functions and procedures, and of the contents of assembler statements, is not comprehensive.

These may be seen as shortcomings, but the program also has considerable potential for enhancement. For example, it can easily be extended to pinpoint all occurrences of a particular keyword, or keywords – as I have done with my own working version of the program.

The expression evaluation section, though rudimentary, can easily be fleshed out and taken as a stand alone program to actually evaluate complete expressions, and not just to check their syntax, thus giving a Basic EVAL-type function that is portable to other machines.

Or more ambitiously, the program could be used as the starting point for a Basic compiler. However I leave the realisation of these possibilities to readers' imagination.

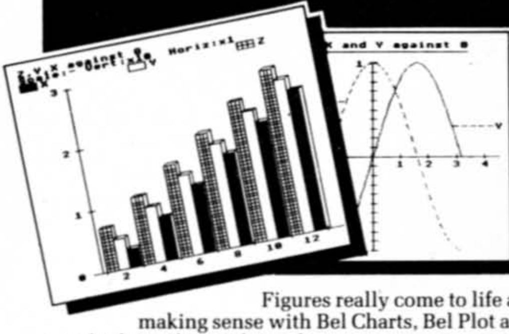
To run any Basic program it has to be stored in the computer's memory in a precisely defined manner so that the Basic interpreter can follow the program.

For ease of handling, the program is split up into small units, called lines, each of which is uniquely identified by its line number. In BBC Basic the permitted range of line numbers is 0 to

Byte	1	2	3	4	5....
Contents	Carriage Return (0D)	Line-no Hi byte (<&80)	Line-no Lo-byte	Line Length	Text of line...

Figure I: Basic line storage

We can easily picture your vital statistics...



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32767 – &0 to &7FFF in hexadecimal notation. For each line of the program, there are a minimum of five bytes allocated in memory, as shown in Figure I.

Note that the fourth byte of the line gives the total length, and so will always be between 5 and 255 in value. It it were 4 there would be no text to the line and the interpreter should therefore have eliminated the line entirely. Any value less than 4 would be disastrous, as the next line would be overlapping the current one.

Byte	1	2
Contents	Carriage Return (0D)	Line-no Hi-byte (&FF)

Figure II: Basic end of program marker

The end of the program is signified by two terminating bytes, as shown in Figure II. The exact value of the second terminating byte is unimportant, as long as the most significant bit is set – that is, it is greater than or equal to &80.

Whenever the interpreter needs to find the end of a program – when OLD, LIST or RUN are used – it conducts a line-by-line search through the program for this terminating sequence.

If the most significant byte of the line number is not set the interpreter assumes that it is the start of another valid line, ascertains its length, and checks that the next byte after the end of the line is a carriage return – &0D.

This can be of use, incidentally, if you ever have that dreaded "Bad program" message, as typing !TOP=&FF0D will put the end of program marker at the point at which the computer found the error, thus recovering as much of the program as possible.

Within the text of the line, the program is a mixture of the normal Ascii characters and special tokens which have particular significance to the interpreter.

When you type in a program line, the whole line consists of Ascii characters. However whenever a Basic keyword is encountered the Basic interpreter converts that keyword to a special token byte.

Among other things, this enables the interpreter to work much faster when the program is actually run. Thus the keyword SOUND, which when typed requires five Ascii characters, is converted to the single byte token &D4.

Whenever a program is SAVEd it is stored in this tokenised form. However whenever a program is listed the tokens are converted back to the full keyword before they are printed otherwise a listed program would be quite unreadable.

This tokenisation/detokenisation process is why you can type keywords in using their abbreviations – such as P. for PRINT, but the complete keyword is always shown when the line is subsequently listed.

The Basic Analyser program relies on this tokenisation of the keywords, as it recognises the tokens when deducing the meaning of every line in the program.

The tokens are easily recognised, as they are all the characters from CHR$128 to CHR$255 inclusive – CHR$&80 to CHR$&FF. In other words, any character with bit 7 set is recognised as a keyword, unless it is within the quotes of a string. The tokens are grouped together in a logical way, according to their meaning, which somewhat simplifies the process of analysing a program.

What I have termed Group I – see Table I – are the arithmetical and logical operators. These tokens range from &80 to &84.

Next comes Group II, a collection of tokens which can only be used in connection with another token – see Table II. These range from &85 to &8D, with one outlier, the token for TO (&B8), which is also used as a part of the keyword TOP – see below.

The biggest group of tokens follows, from &8E to &C5. This group, Group III – see Table III – consists of the system functions, those keywords which give you a value when used in a program. Some require arguments, others do not.

This group is split into a number of sections. First come the system variables, PAGE, HIMEM and so on, from

→

Group 1   Arithmetic and Logical Operators

Token	Keyword
80	AND
81	DIV
82	EOR
83	MOD
84	OR

Note that all these operate on
Integer numbers. Any Real numbers
are first converted to integers.

Table I: Arithmetic and logical operators

Group 2   Special Tokens (can only be used after a specific token)

Token	Keyword	Parameters etc. No	Type	After
85	ERROR	1	St	ON
86	LINE	1	$	INPUT
87	OFF	0		ERROR/TRACE
88	STEP	1	I/R	TO
89	SPC	1	I	INPUT/PRINT
8A	TAB(	1/2	I) or I,I)	INPUT/PRINT
8B	ELSE	1	St or Ln	IF/THEN
8C	THEN	1	St or Ln	IF
8D	(Line-number)	1	3 coded bytes	GOTO/GOSUB/THEN/ELSE
B8	TO	1	I/R	FOR

I = an integer value
R = a real value
$ = a string variable
St = a statement
Ln = a coded line-number

Table II: Special tokens

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&8F to &93. Next come the numerical functions, from &94 to &BC, but with two outliers at &8E, OPENIN – Basic II only, and &C5 – E0F. Note also that the function TOP is a bit odd – it is coded for by the token for TO immediately followed by a P.

Finally, within Group III we have the string functions from &BD to &C4.

The following group, Group IV – see Table IV – should never appear within a program, as they are intended for use in immediate mode only. These tokens go from &C6 to &CE, the last one being the one and only spare token – in Basic II; Basic I also has &8E and &FF spare.

Whenever &CE is used it gives the error message "Syntax error", which is also given if the other tokens in this group are used within a program.

The final group, Group V – see Table V – are the system procedures, with token values from &CF to &FF. The first five tokens are concerned with setting the system variables. These tokens are &40 more than the corresponding function tokens used for getting the values of these system variables.

The remainder of this group are the other procedures, arranged, as with the other groups in alphabetical order, though with three exceptions – SOUND, VDU and COLOUR. Were they originally intended to be BEEP, PAINT and TINT?

Besides the tokenisation of keywords, some line numbers in the program text are also encoded. If a number follows GOTO, GOSUB, RESTORE, TRACE, THEN or ELSE, it is encoded as a four byte sequence, as shown in Figure III and IV. However if a variable or an expression follows GOTO, GOSUB, RESTORE or TRACE, it is not encoded.

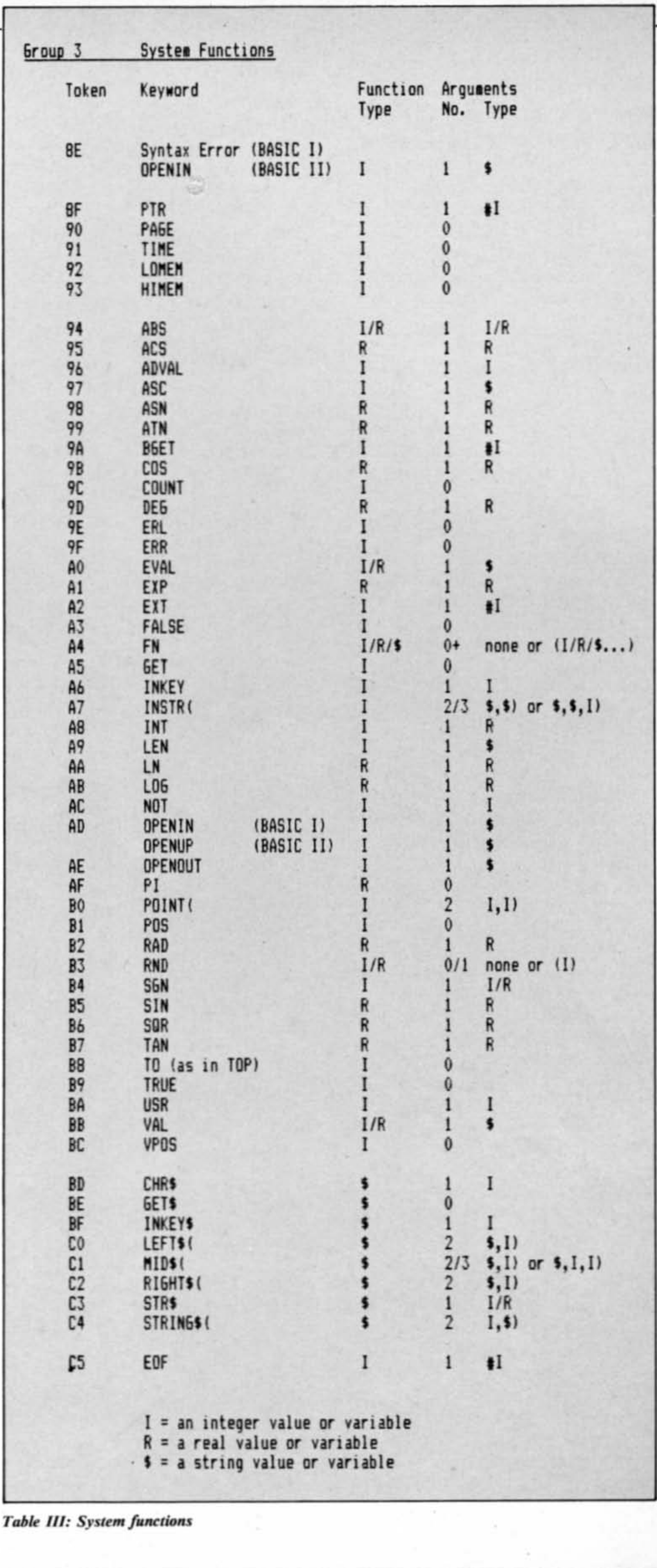
Also, in the line number list following an ON . . . GOTO/GOSUB statement, the line numbers are encoded only until a variable or an expression is found. Any subsequent line numbers in the list are not encoded.

The importance of this is that when a program is renumbered all encoded line numbers are correctly handled, but any other line numbers are left unchanged – which can lead to errors later on.

The syntax of BBC Basic is, on the whole, well described in the User Manual. However there are some points that required special attention in the analyser program.

Variable names may contain all the

→



Group 3 System Functions

Token	Keyword		Function Type	Arguments No.	Arguments Type
8E	Syntax Error	(BASIC I)			
	OPENIN	(BASIC II)	I	1	$
8F	PTR		I	1	#I
90	PAGE		I	0	
91	TIME		I	0	
92	LOMEM		I	0	
93	HIMEM		I	0	
94	ABS		I/R	1	I/R
95	ACS		R	1	R
96	ADVAL		I	1	I
97	ASC		I	1	$
98	ASN		R	1	R
99	ATN		R	1	R
9A	BGET		I	1	#I
9B	COS		R	1	R
9C	COUNT		I	0	
9D	DEG		R	1	R
9E	ERL		I	0	
9F	ERR		I	0	
A0	EVAL		I/R	1	$
A1	EXP		R	1	R
A2	EXT		I	1	#I
A3	FALSE		I	0	
A4	FN		I/R/$	0+	none or (I/R/$...)
A5	GET		I	0	
A6	INKEY		I	1	I
A7	INSTR(		I	2/3	$,$) or $,$,I)
A8	INT		I	1	R
A9	LEN		I	1	$
AA	LN		R	1	R
AB	LOG		R	1	R
AC	NOT		I	1	I
AD	OPENIN	(BASIC I)	I	1	$
	OPENUP	(BASIC II)	I	1	$
AE	OPENOUT		I	1	$
AF	PI		R	0	
B0	POINT(		I	2	I,I)
B1	POS		I	0	
B2	RAD		R	1	R
B3	RND		I/R	0/1	none or (I)
B4	SGN		I	1	I/R
B5	SIN		R	1	R
B6	SQR		R	1	R
B7	TAN		R	1	R
B8	TO (as in TOP)		I	0	
B9	TRUE		I	0	
BA	USR		I	1	I
BB	VAL		I/R	1	$
BC	VPOS		I	0	
BD	CHR$		$	1	I
BE	GET$		$	0	
BF	INKEY$		$	1	I
C0	LEFT$(		$	2	$,I)
C1	MID$(		$	2/3	$,I) or $,I,I)
C2	RIGHT$(		$	2	$,I)
C3	STR$		$	1	I/R
C4	STRING$(		$	2	I,$)
C5	EOF		I	1	#I

I = an integer value or variable
R = a real value or variable
$ = a string value or variable

Table III: System functions

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Byte	1	2	3	4
	Line-no Token (&8D)	Byte a (<&80)	Byte b (<&80)	Byte c (<&80)

Figure III: Encoded line number storage

Group 4 Immediate Mode commands

Token	Keyword	Parameters No.	Type
C6	AUTO	0-2	none, I or I,I
C7	DELETE	1/2	I or I,I
C8	LOAD	1	$
C9	LIST	0-2	none, I or I,I
CA	NEW	0	
CB	OLD	0	
CC	RENUMBER	0-2	none, I or I,I
CD	SAVE	1	$
CE	Syntax Error		

I = Integer value or variable
$ = String value or variable

Table IV: Immediate mode commands

From Page 96

letters – A-Z and a-z – and the underscore and pound characters in any position in the name. They may also have the figures 0-9 in any position except the first character of the name. They may not contain the "at" character @, except in the resident integer variable name @%.

Procedure and function names may contain all the letters, the underscore, pound and at characters, _£@, and the figures 0-9 in any position. The at character @ is also legal in variable names in a DIM statement, but as any array thus created can never be accessed by Basic, this has been ignored in the analyser.

Two keywords, DATA and DEF, may only occur at the start of a line. They may be preceded by spaces, but by nothing else. Both result in the line being skipped as if they were a REM.

This enables one to have multiple entry points into functions and procedures by having several DEFFN/PROC ... lines before a single endpoint. This feature is used at several points in the analyser, though it is not recommended as a good programming practice.

Some keywords can have a statement following them, without an intervening statement separator, :, though a separator is also legal. They are REPEAT, DEFFN ..., DEFPROC ..., IF . . . , THEN, and ELSE. Thus:

```
100 DEFPROCa X=0
```

and

```
100 DEFPROCa:X=0
```

are both perfectly valid.

Two keywords can be regarded as optional – LET in an assignment statement and THEN after an IF clause.

If a number follows either THEN or ELSE it is assumed to be a line number, with an implied, preceding, GOTO.

Brackets are necessary around the parameter list following keywords whose tokens include an opening bracket (INSTR, LEFT$ MID$, POINT, RIGHT$, STRING$, TAB), or for a parameter to the RND function. In all these cases there must not be any spaces between the end of the keyword and the opening barcket.

Brackets are also required round the parameter lists for FNs or PROCs if such lists are required, but note that there can be spaces between the end of the FN/PROC name and the start of the bracketed list.

For those other system functions that take a single parameter there is no need to enclose the parameter in brackets, and spaces are allowed between the keyword and the parameter.

A numeric constant preceded by an ampersand, &, is interpreted as being in hexadecimal notation. To print a number in hexadecimal it must be preceded by a tilde, ~, which must be outside any enclosing brackets. This works both for PRINT and STR$. Thus:

```
a$=STR$~a%
```

or

```
a$=STR$~(a%)
```

are legal statements, but

```
a$=STR$(~a%)
```

is not allowed.

In VDU statements, parameters may be separated by either a comma or a semi-colon. Other parameter lists may only have commas as separators. READ statements may have extra commas in them, which do nothing:

```
READ ,,a,,b
```

is a legal statement, but is treated as invalid by the analyser.

Some statements can have an optional list of parameters after them. READ and VDU need not have a following list, but such statements, being pointless, are treated as invalid by the analyser.

In NEXT statements there may also be an optional list of variables, or simply

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte a	0	1	128s	*64s	0	*16384s	0	0
Byte b	0	1	32s	16s	8s	4s	2s	1s
Byte c	0	1	8192s	4096s	2048s	1024s	512s	256s

Note in Byte a, the 64s and 16384s are stored with the bit inverted (0 instead of 1, and vice versa)

Figure IV: Details of line number encoding

a string of commas, to indicate that more than one FOR . . . NEXT loop is terminated at that statement.

The numerical indirection operators, ! and ?, can be unary, binary, or multiple operators. Thus:

```
a%=!b
a%=b!c
a%=b!c!d?e
```

are all valid expressions, though the last is obscure in meaning. The string indirection operator, $, however, can only be used as a unary operator:

```
a$=$b
```

Note that there cannot be intervening spaces between the indirection operators and their operands, in contrast to all the other operators.

In assembler, the mnemonics can be in upper case, lower case, or any other Ascii characters of the required value MOD 32. Thus:

```
LDA
Lda
,$!
```

are all equivalent.

Also, in assembler, note that A can sometimes be taken to be an implied address, and not a variable value. Thus:

```
ROL A
```

rotates the accumulator, not the address given by the variable A.

Because of the diversity of allowed assembler statements, they are not checked by the analyser. If, however, there is a space immediately following the assembler mnemonic, any variables used in the instruction will be correctly cross-referenced – with the exception of A as an implied address, which is treated as the variable A. Thus:

```
LDA#x
```

will not give a cross-reference to x, but:

```
LDA #x
```

will. However all statement labels are correctly referenced whenever they are defined, as in:

```
.label LDA #x
```

● *Next month we'll give a full description and listing of the main analysis.*

Group 5 System Procedures

Token	Keyword		Parameters/Notes	
			No.	Type
CF	PTR	(=value)	1	#I
D0	PAGE	(=value)	0	
D1	TIME	(=value)	0	
D2	LOMEM	(=value)	0	
D3	HIMEM	(=value)	0	
D4	SOUND		4	I,I,I,I
D5	BPUT		2	#I,I
D6	CALL		1+	I (,list)
D7	CHAIN		1	$
D8	CLEAR		0	
D9	CLOSE		1	#I
DA	CLG		0	
DB	CLS		0	
DC	DATA		‡	list
DD	DEF		‡	FN/PROC
DE	DIM		‡	list
DF	DRAW		2	I,I
E0	END		0	
E1	ENDPROC		0	
E2	ENVELOPE		14	I,I...
E3	FOR		‡	
E4	GOSUB		1	I
E5	GOTO		1	I
E6	GCOL		2	I,I
E7	IF		‡	integer expression
E8	INPUT		‡	list
E9	LET		‡	variable assignment
EA	LOCAL		‡	list
EB	MODE		1	I
EC	MOVE		2	I,I
ED	NEXT		‡	optional variable-list
EE	ON		‡	
EF	VDU		1+	I... (separated by , or ;)
F0	PLOT		3	I,I,I
F1	PRINT		‡	list
F2	PROC		‡	(optional bracketed list)
F3	READ		‡	variable-list
F4	REM		0	
F5	REPEAT		0	
F6	REPORT		0	
F7	RESTORE		0/1	none or I
F8	RETURN		0	
F9	RUN		0	
FA	STOP		0	
FB	COLOUR		1	I
FC	TRACE		0/1	none, I, ON or OFF
FD	UNTIL		‡	integer expression
FE	WIDTH		1	I
FF	Syntax Error	(BASIC I)		
	OSCLI	(BASIC II)	1	$

I = Integer value or variable
$ = String value or variable
‡ = Special

Table V: System procedures

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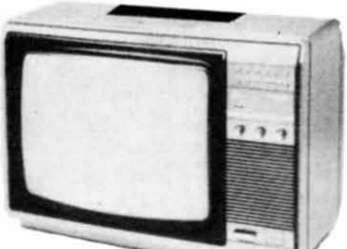

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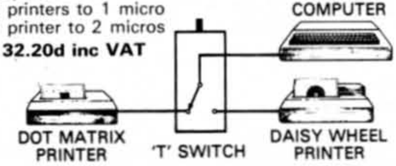

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Scan a disc of files – fast

GEOFF TURNER tells you how to keep your files up to date the easy way . . .

AS a regular user of the program, I find I have accumulated several discs full of Wordwise files. I tend to keep copies of all letters and other material that I have written.

Many of the files have been kept for some time, and are not really needed any more. However, when I look back at these discs, I find it difficult if not impossible to remember exactly what all the files are – particularly as many have obscure and meaningless filenames.

The only way to check them is by entering Wordwise and loading in each file, reading through it and deciding if it may be deleted. I find this rather time-consuming, and it is very easy to delete files in error.

This Disc Scanner utility allows me to quickly scan through the entire disc, looking at a portion of each file, and allowing it to be deleted if no longer required.

The program first of all reads in the disc catalogue from track zero, and then accesses each file in turn to read in some data. The first 20 lines of the file are displayed, together with the file name.

Pressing the spacebar will scroll the screen, and display the next 20 lines. It is therefore possible to scan through just a short section of the file, or the entire file if you wish.

Pressing the Return key terminates the scan, and the program asks if you wish to delete the current file before continuing on to the next tile.

This process continues until all files have been scanned.

Although the utility is designed specifically for scanning Wordwise or other text files, it does not actually distinguish between various types of file. Therefore the program will work quite happily with Basic, machine code or indeed any type of file.

Basic programs will appear partly garbled due to the way in which they are stored. Keywords are of course tokenised and will not appear in full.

However if, like me, you always head your Basic programs with suitable REM statements, then the files will be easily recognisable as they are scanned. Machine code files will, however, be complete garbage.

Let's take a look at how the program works. There are a couple of machine code routines which are assembled at lines 90 to 420. The first routine, catalogue, is used to read in the catalogue details from the disc, while the second routine, delete, is used to delete files.

In order to read the catalogue, we need to access the disc controller directly with an OSWORD call. A parameter block is set up to instruct the controller to read in the data from track 0, sector 0, of drive 0.

Note that although the full catalogue details are stored on sectors 0 and 1, we are only interested in the filenames which are located on sector 0.

The filenames are read in and stored in Page &C00 ready for later access. PROCfilename which is called from line 690 extracts the first filename from Page &C00. Actually the first name is the disc title, which is ignored.

It is necessary to rearrange the filename by inserting the directory symbol and a "." before the true name. This is necessary if the disc has more than one directory. The filename is then displayed at the bottom of the screen.

PROCget is then called from line 790. This procedure opens the selected file, and uses BGET to read in individual bytes of data.

Only text characters between 32 and 126 are displayed on the screen, but line 1110 also inserts line feeds whenever character 13 is detected.

Enough data is read in to fill the screen window, at which point the program will wait for either the Spacebar or the Return key to be pressed.

The Spacebar causes the program to continue the read procedure until the end of file is reached. If Return is pressed the file is closed, and the program asks if you wish to delete it. Answering no to this question will leave the file intact, and the program will move on to the next file from the catalogue.

When it is required to delete a file PROCdelete is called. Because the filename is held as a variable, F$, it is not possible to directly use the *DELETE command. To get around this problem, a call to OSCLI is activated using the machine code routine DELETE.

A string is assembled consisting of the word DELETE plus a space plus the filename F$. This new string, D$, is placed in memory by line 1430 ready to be used when OSCLI is called. D$ is then passed to the command line interpreter.

When all files have been scanned, the program tidies up the disc by locking all the remaining files at line 910.

A word of warning. When typing in the program and performing test runs, do not use an important disc. If the machine code has been entered incorrectly you may find that the disc catalogue has been erased, making your important files inaccessible.

It's far better to make a copy of your Wordwise disc before testing the program.

PROCEDURES

filename	Reads a filename from the copy of the catalogue held in memory.
get	Gets individual bytes from the currently selected file.
eof	Indicates when end of file has been reached.
delete	Deletes files using OSCLI.

VARIABLES

I%	Pointer to next filename.
F$	Filename.
N	Character read from file.
D$	Delete command line.

Complete listing starts on Page 141

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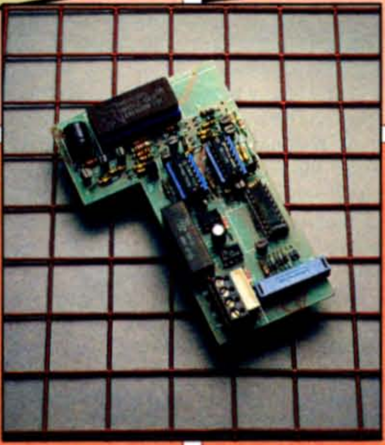

NEWS RELEASE
OBBS Bulletin board software

Now, with OBBS and the Nightingale modem fitted with auto-answer accessory board, you can run your own bulletin board on a BBC micro. The entry level system includes many features normally only found on systems costing ten times as much. Full message searching and XMODEM uploading and downloading of software are provided along with unique colour teletext graphics and text facility. **£21.74 plus VAT**

COMMSTAR Nominated for the 1985 British Microcomputing award, Commstar is an outstanding piece of software. With it's powerful combination of Viewdata and ASCII terminal capabilities, Commstar is probably the only communications software you will ever need.

Developed specially for the BBC in an 8K eprom, Commstar once fitted, is always ready to use. Although it is unusually versatile Commstar is also very easy to use. Full advantage is made of the BBC's function keys and a comprehensive manual describes each of Commstar's features in simple terms. In addition to preprogrammed functions, items such as logon strings and passwords can be placed under the function keys to facilitate automatic access to the vast range of services which are available. When used in conjunction with the Nightingale modem or other multi-standard modems, Commstar opens up a host of possibilities. Did you know that you could access your bank account from your own home or search British Lending Library's records through their on-line system, BLAISE. Accessing Prestel for the latest news or downloading telesoftware from Micronet is just the beginning. . . .

NIGHTINGALE ACCESSORY BOARD This new accessory for Nightingale offers three new facilities on a single card. The auto-dialler now means that you can dial any number without using the telephone. Software designed for use with Commstar will dial a specified number or sequence of numbers once or more until a connection is established, each call being optionally monitored through a loud speaker. Any number of directories can be created and for each telephone number in a directory you may specify a series of attributes which allow Commstar to configure itself automatically for that particular system. Nothing could be easier. Any baud rate may be configured under software control including two new operating speeds 1200 and 600 half duplex which were not previously available. Finally, if you hope to set up your own database or bulletin board, the accessory board includes auto-answering.
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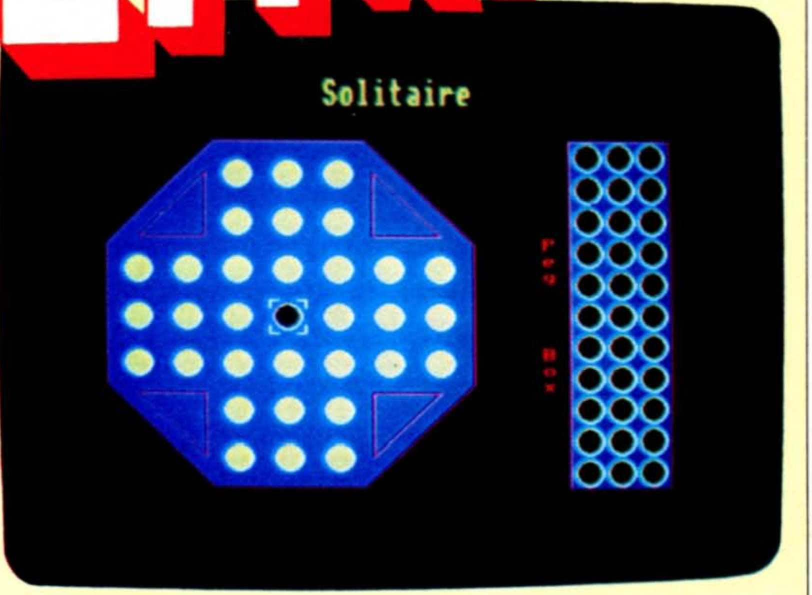
All by yourself? Then play . . .

SOLITAIRE



BRIAN and MARTIN BOND present an off-the-peg micro version of this traditional game

AS in the traditional board game, the object of Solitaire is to remove all the pegs but one from the board. This is achieved by jumping one peg over another into an empty space. The jump may be either vertical, horizontal or diagonal.

To determine a jump you simply move the sight over the peg you want to move, press Space, then move the sight to the destination hole and press Space once more. You guide the sight by the standard Snapper keys:

Z	*left*	/	*down*
X	*right*	:	*up*

If you find yourself snookered, you can press Q to quit.

In addition to the original concept we have introduced a few interesting features such as volume adjustment and a choice of two game options.

If you select option one the last peg must finish up in the centre hole – this can be rather tricky. The second, easier, option allows you to finish with the final peg in any of the nine centre holes.

Full instructions and prompts are incorporated in the program, as well as error checking to eliminate cheating.

Type in the listing and save it. Disc users should download the program to &E00 before running it.

Complete listing starts on Page 143

PROCEDURES

instruct	Prints full game instructions and keys used.
options	Describes game options and prompts for option number.
init	Initialises program variables and sets up user defined characters.
layout	Draws main playing area and prints pegs on board.
large	Produces double height letters.
cursor	Draws sight at current X,Y coordinates.
inkey	Main loop, to move cursor within playing area and check for other command keys pressed.
volume	Allows adjustment of volume.
false	Displays prompt if an illegal move is attempted.
check	Checks for valid move and carries out appropriate action.
delay	General purpose delay loop.
peg_box	Stores and displays pegs removed from main board and decrements the number of pegs left by one.
remove	Allows player to remove first peg when game option two has been selected.
check_holes	Checks to see if the last peg resides in one of the nine central holes, when option two is selected.

VARIABLES

op%	Stores game option number.
X 1%,Y1%	Coordinates of current cursor position.
vol%	Stores volume level.
x1%,y1%	Logs coordinates of position to move from.
x2%,y2%	Logs coordinates of position to move to.
F%	Flag used if an illegal move is attempted.
peg%	Stores the current number of pegs in play.
ro%,co%	Coordinates for stacking the pegs in the box.
Peg$	Assembles the user defined characters to form a peg.
Hole$	Assembles the user defined characters to form a hole.
X%,Y%	General purpose variables, used by the program.

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★ INPUT—is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the coming utilities disc were written using this procedure.
★ TUBE—compatible with the 6502 second processor.
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In addition to working with the standard single density DFS's REPLICA II is now compatible with the following double density DFS: OPUS 3.45, UDM v. 2.00 and CUMANA QFS.

The original REPLICA set a very high standard so the specification that we set our chief programmer presented him with a real challenge. In fact REPLICA II is now 2 separate programs, one for DFS using the 8271 controller and the other for the various DDFS that fully implement OSWORD &7F. REPLICA II will transfer many of your cassette based programs to disc, even more than REPLICA did. Now when you buy disc drives you do not have to throw away your expensive cassette based programs.

REPLICA II transfers 'LOCKED' programs, programs loading as files, programs that load below &EOO, those with up to 9 sections and those up to &6E in length e.g. adventure programs. No more waiting for 6 minutes whilst your adventure programs load.

REPLICA II is very easy to use and the user just enters a name, how many sections and whether CHAIN, *RUN or *LOAD is used to load the first section. Press play and let the program do the rest, even a menu. Just think how much it will cost you to buy a disc version of your favourite program—it is probably more than REPLICA II, which will hold up to 16 programs, limited only by the disc capacity and catalogue.

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This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Account customer details are inserted automatically and delivery notes generated automatically when required. Customer details without account numbers can be automatically placed in a Beta-Base compatible file for use as a mailing list.

A sales ledger sheet is printed automatically when there is enough data to fill a page, alternatively the user can print the ledger sheet before a full page to suit his needs. VAT details are generated at the end of the VAT period and the year to date figures can be viewed at any time. Provision is made for multiple VAT rates including standard, zero, export and exempt.

A transaction file is generated for account customers for use with the STATEMENTS and ACCOUNTS RECEIVABLE module.

Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER. All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. A Beta-Base Utilities Disc will soon be available and will provide Mail-Merge facilities and links into ULTRACALC plus many other features.
★ INTEGRATED ACCOUNTS and DATABASE
★ MULTIPLE VAT rates
★ SCREEN EDITING with insert & overwrite
★ AUTOMATIC DELIVERY NOTES
★ INVOICE COMMENTS
★ ACCOUNT HOLDERS details inserted automatically
★ MAILING LIST generated automatically
★ LEDGER SHEET printed automatically
★ VAT sales returns prepared
★ TRANSACTION FILE generated
★ Beta-Base compatible

This program was written for our own use and is used to prepare hundreds of invoices per week. It has no unnecessary questions or keys to press and extensive but easy edit options, we have made life as easy as possible for ourselves so why not take advantage of our efforts.

Requires double sided single or twin single sided drives for minimum configuration –no stock control or customer database. Double sided twin drives will enable a full integrated system to be used.

FUN HOUSE £10.00

40 80 3"

FUN HOUSE is a highly original suite of educational programs suitable for ages 3 to 13. The program is designed to encourage children to spell words which relate to objects found around the home. Animation and music are used to good effect and some highly original ideas are incorporated. Each room exercise is terminated with a warning item e.g. the lounge finishes with 'FIRE' which goes on to engulf the whole lounge. Tests with a newly hired 4 year old resulted in us having to prise him away from the keyboard after 2 hours. In that time he had gone from never having used a keyboard to finding the location of all the keys very quickly and entering the correct answer. He had thus started on the path to learning spelling and familiarised himself with the keyboard including the use of DELETE to correct his mistakes. Can you afford not to give your children the same start?

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BROM

21

EXTRA COMMANDS

THE NUMBER ONE

TOOLKIT ROM
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BROM EPROM £34.50 40 80 3" £27.50

BROM is the first toolkit ROM to provide a FULL SCREEN EDITOR, which means that you can scroll your program up and down just like WORDWISE does with text, do not confuse this powerful editor with the line editor used in other toolkit ROMs. The EDITOR allows insertion and deletion of lines and insert and overwrite within a line. This is the editor that the BBC micro should have had.

Closely related to the EDITOR is the EXTENDED ERROR HANDLING which will trap errors in a program and enter the EDITOR at the line generating the error, not only that but it will also position the cursor as near to the statement causing the error as possible, no more wading through multi statement lines trying to identify the error.

Commands unique to BROM are:

ROMON & ROMOFF which enable you to turn on/off sideways ROMs so that they stay off even after CTRL/BREAK, very useful for avoiding clashes especially for users with second processors. This also works with the DFS and reverts to PAGE &EOO automatically.

CASE which forces input into upper or lower case irrespective of caps/shift lock.

FLIST which lists a program one statement to a line but more importantly it will even list 'BAD PROGRAMS.'

ONEKEY is a single key entry option but you can also define your own strings to any ASCII key, just like an extra 48 function keys.

Another group of commands provide FIND and selective or global SEARCH and REPLACE facilities. These commands work with strings and keywords or a mixture of both e.g. '*FIND PROChelp T', will list the full line containing PROChelp, the 'T' simply tokenizes any keywords.

Yet another group of commands allow lines to be moved or copied to a new location.

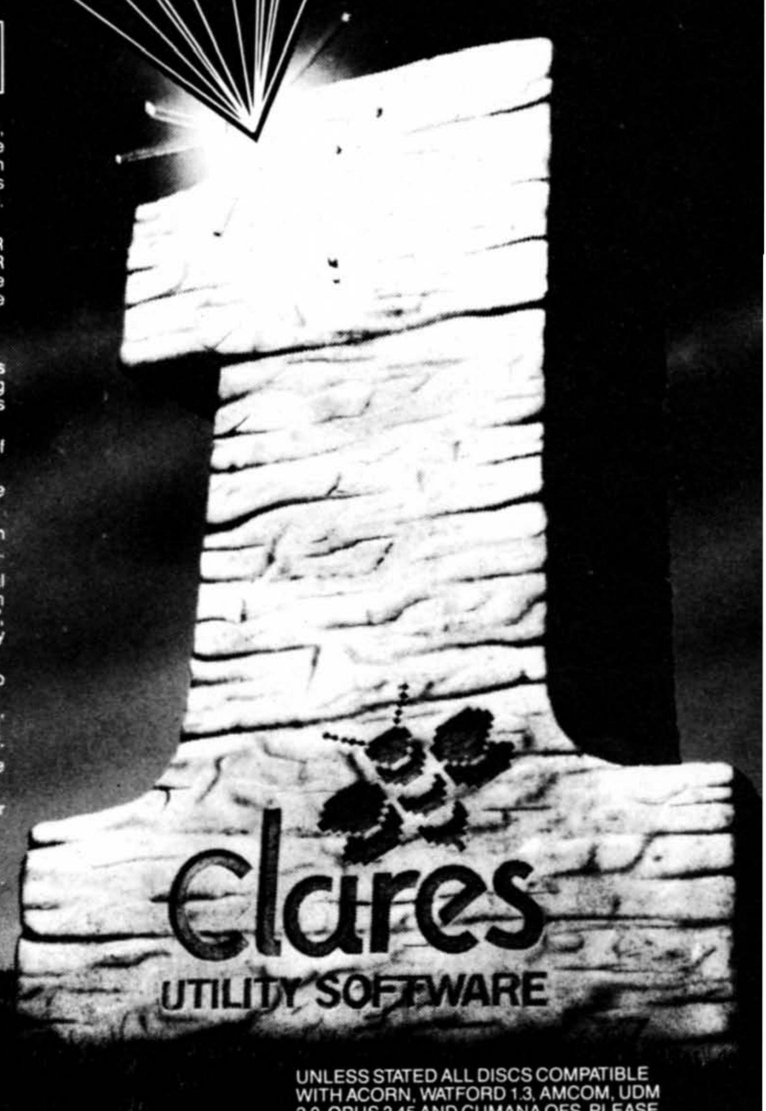
The other commands provide function key editor, 'BAD PROGRAM' cure, variable lister, integer variable flush, program compacter etc.

This is a genuinely useful ROM that no user should be without. Be warned, once used you will not be able to live without it!

"...this is the best On-Screen BASIC Editor I have ever used; it is far superior to BEEBUG softs Toolkit."

Viewfax Tubelink

The Brom disc is suitable for use with SOLIDISK SIDEWAYS RAM.



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SLAVE

... your most obedient servant

FOLLOWING on from last month's update on 8k basic utility ROMs for the BBC Micro, we now turn to the last 16k superstars.

Can these ROMs, with a code length as long as BBC Basic itself, supply near-perfect implementations of all the extra facilities a programmer needs on a single chip? The answer would seem to be pretty close. But which is the one most suited to you?

The major additional facilities a BBC Micro programmer requires are:

- Basic programming aids to give information on and to debug or alter Basic programs.
- Machine code aids to analyse, disassemble, assemble or alter memory directly.
- Filing system aids to give information on, categorise, search, verify and alter disc files and sideways RAM or ROM.
- Enhanced error messages and easy editing plus compatibility with add-ons such as second processors, shadow RAM and other sideways ROMs.

Acornsoft's recent Basic Editor concentrates on the first and the fourth of these requirements and is the subject of a separate review. Pace's Toolstar 8k was one of the first to attempt a combined utility role. Now two 16k multifunction utility chips – A&F's Slave and Altra's Probe – currently offer many of these extra facilities which the all-purpose programmer needs.

This month's review will cover the first-mentioned of these supeROMs, Slave.

Programmers Aughton, Pennington and Piumarta certainly have a combination to be proud of in Slave. This chip has not been out of my micro since the day I was given it for review and it has been in constant use throughout.

Slave is provided on a 16k eprom and comes with adequate though not costly or wasteful packaging, and a Slave Driver's Guide – or manual.

A mixture of 31 useful Basic, machine code and disc * commands are available which are listed in Figure I. They may all be prefixed with a Z to avoid clashes with similarly-named commands on other ROMs.

Slave itself does not alter PAGE. It is a service ROM and is fairly second processor-compatible. It may also be partially disabled or totally disabled and re-enabled using *FX30 commands.

The delightfully-named manual is 66 pages of A5 format and is excellent both in production and useage.

I will now cover Slave's facilities under three headings. These do not necessarily conform to A&F's classification in Figure I but are similar to our previous reviews of toolkit type ROMs.

By
MIKE MAHON

Basic utilities: This is possibly the weakest area in Slave's repertoire, probably partly because such features are so widely available on other utility chips.

The 13 commands are listed by *HELP PROG or *PROG. The utilities are good on quality and poor in quantity. Suprisingly, "memory free" information, a partial renumberer, variable dumper, listing formatter, verify and merge program routines are not present.

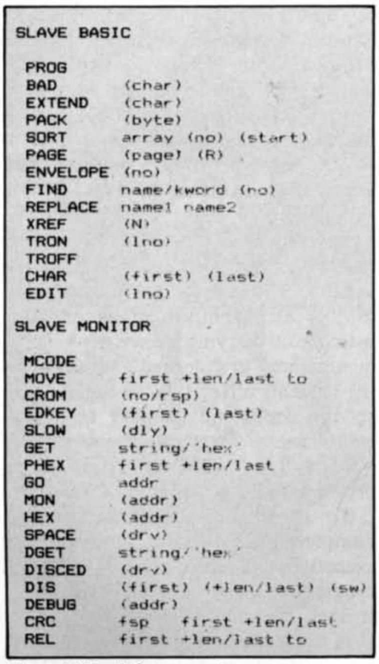
The function key editor *EDKEY is good. It lists all 16 key contents ready for editing and indicates their bytes free. Similarly *ENVELOPE assists editing of up to 16 envelopes, and character sets may be shown with *CHAR – including their VDU definitions.

Searching for keywords or strings is very straightforward using *FIND. The number of found lines displayed may be selected by the user. However the command still has much room for improvement as items searched for are not highlighted. Nor was it possible to locate symbols such as / + — and so on. Items such as the latter could, however, be found with the machine code routine *GET, though this is more cumbersome.

The *REPLACE feature was very easy to use and fairly intelligent in operation. For example, it would replace a lone variable A and ignore the letter A within the variable "NAME$". Wisely, it also does not operate on keywords.

Its shortcoming was its lack of a selective replace option – it may be too late to rectify the damage done by a global mis-alteration.

Of particular value was the *XREF – cross referencer – utility. This gives an alphabetic listing of all line number occurrences of program string variables, or numeric variables – except line number references.



```
SLAVE BASIC

 PROG
 BAD        (char)
 EXTEND     (char)
 PACK       (byte)
 SORT       array (no) (start)
 PAGE       (page) (R)
 ENVELOPE   (no)
 FIND       name/kword (no)
 REPLACE    name1 name2
 XREF       (N)
 TRON       (lno)
 TROFF
 CHAR       (first) (last)
 EDIT       (lno)

SLAVE MONITOR

 MCODE
 MOVE       first +len/last to
 CROM       (no/rsp)
 EDKEY      (first) (last)
 SLOW       (dly)
 GET        string/'hex'
 PHEX       first +len/last
 GO         addr
 MON        (addr)
 HEX        (addr)
 SPACE      (drv)
 DGET       string/'hex'
 DISCED     (drv)
 DIS        (first) (+len/last) (sw)
 DEBUG      (addr)
 CRC        fsp   first +len/last
 REL        first +len/last to
```

*Figure I: Slave's * commands*

If *XREF N is selected, you don't even need to run the program. I still cannot understand why all Basic utility chips do not possess this feature. The resultant display from Slave was very neat and readily printable.

Slave also possessed a decent stepwise tracer, *TRON and *TROFF, which displayed the current line number at the top left of the screen during a program run.

Running/tracing speed was readily selectable by pressing the Ctrl or Shift keys. A similarly useful feature was the *SLOW function. This command effectively slowed down the computer by an amount 0 to 255 specified by the user.

For example, a text or graphics screen may be seen to build up step by step enabling demonstration of programming techniques or for debugging. It was really amazing to see a mode change clear the screen pixel by pixel or a single character slowly drawn – upwards – on the screen in Mode 2.

Slave's *PACK is one of the best Basic program compacters around. It is capable of removing end of line spaces, start of line spaces, REMs, assembly comments, other spaces or any combination of these under user control. It is also fairly intelligent in leaving line numbers intact in case they are referred to elsewhere in the program.

Facilities for fixing "bad programs" – *BAD, *EXTEND – are particularly extensive on Slave and worked quite well. They also included the possibility of overwriting control codes which may inhibit program listing. Programs may also be moved to or run at new PAGE boundaries with *PAGE which, incidentally, makes it easier to have a number of programs resident in the computer at one time.

Also included in Slave's Basic command set is a feature I have only seen once before, on Addcomm. This is *SORT, which as you might imagine will sort the data within an array into ascending order. Though this is an excellent utility, and very fast – it sorted 500 numbers in five seconds – it suffers from lack of portability between machines without the Slave chip.

Last but not least in this section, *EDIT invokes a powerful Basic screen editing facility which makes it much easier to check and alter Basic programs in a dynamic fashion.

‘EDIT makes it much easier to check and alter Basic programs in a dynamic fashion’

This is a particularly versatile implementation allowing for backward or forward scrolling either line by line or half a screenful at a time, character deletion, character addition by insertion or overwrite, insertion or removal of lines, and escaping back to Basic.

This editor was a very close rival to the superb editor on Clare's BROM reviewed last month.

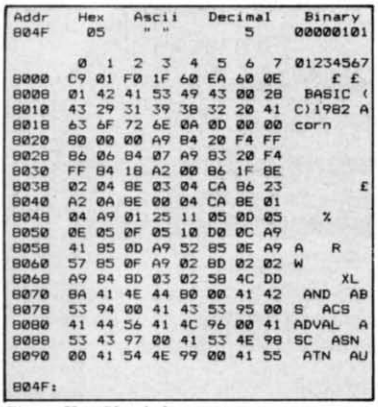
Machine code utilities: This area is Slave's *pièce de résistance*. The facilities offered here are excellent both in implementation and ease of use and really do make Slave an obedient and willing servant. These commands along with the filing system commands are revealed by *HELP MCODE or *MCODE.

*MOVE, as expected, allows the user to relocate a block of memory. The facility is intelligent and correctly takes care of potentially overlapping areas during translocation. It is also fairly versatile in its syntax and can be used to download a selected ROM into RAM or to move a sprite around the screen.

A similar relocating command, *REL, is also included in Slave and this is capable of altering most address references internal to the code to the values required for its new location.

In addition, the whole of or a selected portion of memory may be searched for a particular string or byte using *GET. The required item may be entered in

→

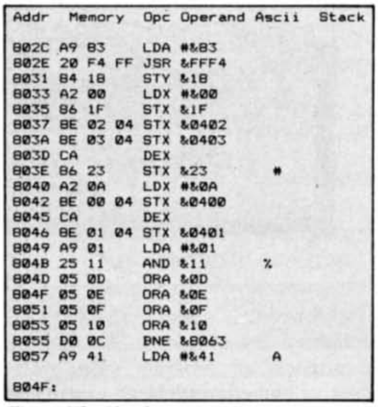


```
Addr   Hex    Ascii    Decimal    Binary
804F    05     " "           5   00000101

        0  1  2  3  4  5  6  7  01234567
8000   C9 01 F0 1F 60 EA 60 0E      £ £
8008   01 42 41 53 49 43 00 28   BASIC (
8010   43 29 31 39 38 32 20 41  C)1982 A
8018   63 6F 72 6E 0A 0D 00 00  corn
8020   80 00 00 A9 84 20 F4 FF
8028   86 06 84 07 A9 83 20 F4
8030   FF 84 18 A2 00 86 1F 8E
8038   02 04 8E 03 04 CA 86 23         £
8040   A2 0A 8E 00 04 CA 8E 01
8048   04 A9 01 25 11 05 0D 05     %
8050   0E 05 0F 05 10 D0 0C A9
8058   41 85 0D A9 52 85 0E A9  A   R
8060   57 85 0F A9 02 8D 02 02  W
8068   A9 B4 8D 03 02 58 4C DD        XL
8070   8A 41 4E 44 80 00 41 42   AND   AB
8078   53 94 00 41 43 53 95 00  S  ACS
8080   41 44 56 41 4C 96 00 41  ADVAL   A
8088   53 43 97 00 41 53 4E 98  SC  ASN
8090   00 41 54 4E 99 00 41 55   ATN  AU

804F:
```

Figure IIa: Slave's hex screen

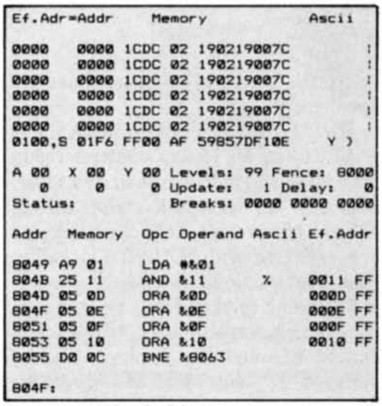


```
Addr  Memory   Opc Operand Ascii  Stack

802C A9 83     LDA #&83
802E 20 F4 FF  JSR &FFF4
8031 84 18     STY &18
8033 A2 00     LDX #&00
8035 86 1F     STX &1F
8037 8E 02 04  STX &0402
803A 8E 03 04  STX &0403
803D CA        DEX
803E 86 23     STX &23        #
8040 A2 0A     LDX #&0A
8042 8E 00 04  STX &0400
8045 CA        DEX
8046 8E 01 04  STX &0401
8049 A9 01     LDA #&01
804B 25 11     AND &11       %
804D 05 0D     ORA &0D
804F 05 0E     ORA &0E
8051 05 0F     ORA &0F
8053 05 10     ORA &10
8055 D0 0C     BNE &8063
8057 A9 41     LDA #&41       A

804F:
```

Figure IIb: Slave's monitor screen



```
Ef.Adr=Addr     Memory            Ascii

0000    0000 1CDC 02 190219007C        :
0000    0000 1CDC 02 190219007C        :
0000    0000 1CDC 02 190219007C        :
0000    0000 1CDC 02 190219007C        :
0000    0000 1CDC 02 190219007C        :
0000    0000 1CDC 02 190219007C        :
0100,S 01F6 FF00 AF 59857DF10E    Y )

A 00  X 00  Y 00 Levels: 99 Fence: 8000
  0     0     0 Update:   1 Delay:    0
Status:          Breaks: 0000 0000 0000

Addr  Memory   Opc Operand Ascii Ef.Addr

8049 A9 01     LDA #&01
804B 25 11     AND &11       %    0011 FF
804D 05 0D     ORA &0D            000D FF
804F 05 0E     ORA &0E            000E FF
8051 05 0F     ORA &0F            000F FF
8053 05 10     ORA &10            0010 FF
8055 D0 0C     BNE &8063

804F:
```

Figure IIc: Slave's debug screen

From Page 104

Ascii or hex and can also include wildcards. For example, typing *GET BASIC in my machine produced:

03E5 0705 07C1 7D68 7D8E 8009 DF19

I found this especially useful for quickly locating keywords within sideways ROMs. With the rest of the trio – *FIND and *DGET – Slave therefore has fairly thorough searching capabilities.

Now we come to Slave's most powerful and distinctive features, the memory editors. These may be entered by *HEX, *MON or *DEBUG and the user can swap between them by pressing Ctrl+H, Ctrl+M or Ctrl+D while remaining at the same location in memory.

Ease of use and superb Mode 7 colour displays make these comprehensive facilities the highlight of Slave. Their different screen formats are shown in Figure II. A thoughtful addition for monochrome users is that colours may be switched off with *FX30 commands.

In the editors the user may enter addresses (four characters), hexadecimal data (two characters), Ascii characters (one character or a string in quotes), assembler mnemonics (three characters), or command lines (*commands).

Any portion of memory may be observed, the desired sideways ROM being selected previously with *CROM – see next section.

*HEX enters a display editor showing both a hexadecimal and Ascii dump of memory contents. The current editing byte is also displayed at the top of the screen in hex, Ascii, decimal and binary notation. Ctrl+Tab toggles the latter item between binary, Basic token or assembler mnemonic.

Moving around memory is controlled by the cursor, Ctrl and Shift keys in Wordwise fashion and is very fast indeed.

In addition, dynamic areas of RAM where bytes are continually changed may be revealed with the Tab key which refreshes the screen. This is rather like *MZAP in Disc Doctor.

Altering bytes of memory is done simply by entering the appropriate length word.

The memory may also be dumped to the printer in an 80 column 16 bytes per line format using *PHEX. This routine may even be called from within the memory editor itself.

*MON enters the mnemonic monitor where disassembled 6502 opcodes are clearly displayed in Mode 7 colour. Slave can disassemble forwards or backwards, slow or fast, all controlled by the cursor keys. Also a series of branches may be traced without losing the current memory position.

Incrementing or decrementing the start address of the disassembly by one position is very useful as it may change the sense of the output and replot the screen. New code may be assembled simply by entering the hex, Ascii or mnemonic labels from the keyboard as desired.

Memory may also be disassembled directly to an output channel, screen – in monochrome only – disc, tape or printer using the *DIS command.

This feature is more versatile than the monitor in the variety of displays offered. For example, any or all columns of the disassembly in Figure IIb may be displayed and spaces may be stripped to decrease output size. Furthermore, an amazing three pass disassembly with added labels showing origin, data, jump, branch, table and vector locations can be selected.

Slave disassembled Basic II and made the code more understandable by adding 1159 labels in around 50 seconds. And remember, this could be sent direct to disc or printer and so on.

As if all these machine code utilities were not enough, there is still one major facility to come, the single step debugging routine entered via *DEBUG. Like the memory dump and disassembler options, this utilises a colour display scrolled under cursor control.

The upper part of the screen allows the user to visualise up to six selected areas of memory and the stack information. The lower part acts as a shortened version of the *MON routine together with an input line.

The middle portion provides status information for the contents of the accumulator, X and Y registers and the processor flags. It also shows the current setting of DEBUG commands.

Using this utility, the programmer may step through disassembled memory at varying speeds and increments, jump to a desired address, alter the contents of registers or status flags, set the depth and memory range for subroutine displays, step over invalid code and set or clear up to three breakpoints.

To quote the manual: "This is a complex utility that allows you to execute machine code subroutines and programs under controlled conditions". It does this very well indeed.

A few features not present on Slave but available on many of the dedicated machine code monitor chips include the ability to display operating system labels – OSBYTE, OSNEWL and so on – during disassembly, memory block fill, delete or insert routines, setting of fully conditional breakpoints, emulation of interrupts, dual screen facilities, and debug output to a printer.

Machine code routines may also be executed with Slave's *GO which can also work in the "no language" environment and hence with second processors.

Filing system utilities: Among this group are features for observing and editing data on sideways RAM or disc, and for checking the contents of sideways ROM or tape files.

*CROM is probably the feature of Slave I use most as it lists the sideways ROMs present in my machine and allows me to select one for examination of memory contents.

Surprisingly, and I think mistakenly, Slave does not have any facility for switching off sideways ROMs and I therefore still need to have Rom Manager or Beebman in my machine at the same time – BROM also has good ROMoff facilities but was not compatible with Slave.

Another especially useful command is *CRC which computes a hexadecimal cyclic redundancy check value for data on file or in RAM or ROM. This can act as a verifier for comparing a program on file for a perfect match with one in the computer's memory.

For disc users *SPACE is good value in giving the number of sectors free and the maximum room – extent – available for further storage. This would be used to check whether COMPACTing of disc space was necessary.

The information provided could be a little more user-friendly as only hexadecimal values are shown. It would also be a lot more useful if similar information was provided about current memory usage on the micro.

Without doubt the best feature in this section is the disc sector editor called by *DISCED. This is somewhat similar in appearance to the one included on the Watford DFS and is certainly a boon to Acorn DFS users.

A Mode 3 display giving a clear hex and Ascii representation of a disc sector is portrayed – see Figure III. Moving around the disc and altering bytes was extremely easy using the Tab, Shift, Ctrl and cursor keys. The disc editor, however, could not cope with specially protected discs incorporating bad tracks and similar nasties.

For use in conjunction with the editor is an amazing find routine, *DGET, which will search the whole disc side for every occurence of a specified string or byte and then enter the editor at the appropriate place. Pressing the Copy key then moves the editor on to the next occurrence of the item and so on.

Like the *GET command, wildcard facilities may be incorporated into the search, thus providing a very powerful routine indeed.

Slave worked perfectly with numerous sideways ROMs including different disc filing systems. The only clashes I found were with Clare's BROM.

The Basic utilities were not compatible with second processors, which is common to many other older utility chips. Some of the disc editing commands showed limited use with the parasite processor switched on and often crashed the machine.

The powerful memory editing features were compatible with the 6502 second processor, but unfortunately only examined or edited host processor memory – a rather limited option nowadays. A few of the less important commands for editing characters, envelopes or function keys did, however, seem to show full compatibility.

Slave provides a rich variety of useful and sometimes unique commands for the BBC Micro user. Its memory and disc editing features in particular make it an outstanding utility chip worthy of a sideways ROM slot in your machine.

The Basic utilities are probably the weaker part of Slave's features, mainly because some important ones are missing and a few are not fully implemented – thus I still require the use of Beebugsoft's Toolkit. However, the inclusion of a cross-referencer and good screen editor probably makes amends for this.

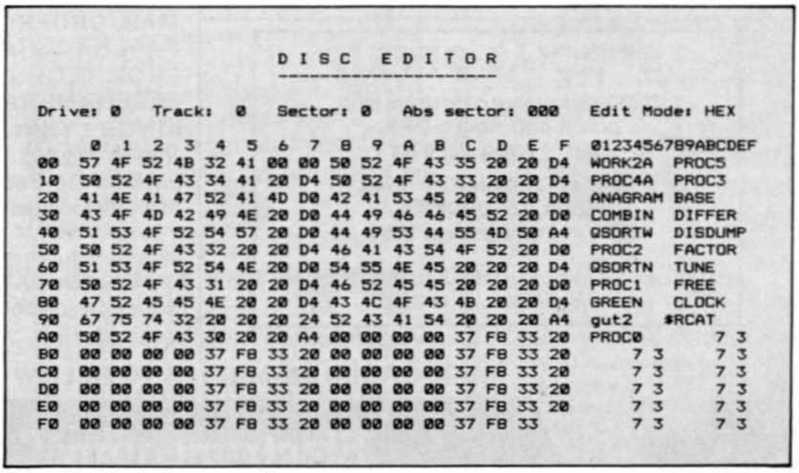
The machine code utilities were excellent, though limited to the host processor. Certainly the filing system utilities are very powerful and user-friendly and a delight to use.

If only a ROMoff feature were available and full second processor compatibility included as well, this section of Slave would be complete. Perhaps an updated version may find room for these additions.

The only other comparable eprom to compete for its position in the BBC Micro is Altra's Probe which would seem to offer some better Basic editing and disc utilities with greater second processor compatibility, though inferior machine code features.

What a pity, as usual, that ALL the best features are not on the same chip – or even more to the point if only we could access a 32k ROM as in the B+ on the standard BBC Micro.

I suppose the latter thoughts are just sheer greed, as we already have a marvellous collection of sideways ROMs for our machine – but the prospect of awaiting the next and better chip is what makes microcomputing on the Beeb so exciting.



```
                    D I S C   E D I T O R
                    ---------------------

Drive: 0   Track:  0   Sector: 0   Abs sector: 000   Edit Mode: HEX

     0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F  0123456789ABCDEF
00   57 4F 52 4B 32 41 00 00 50 52 4F 43 35 20 20 D4  WORK2A  PROC5
10   50 52 4F 43 34 41 20 D4 50 52 4F 43 33 20 20 D4  PROC4A  PROC3
20   41 4E 41 47 52 41 4D D0 42 41 53 45 20 20 20 D0  ANAGRAM BASE
30   43 4F 4D 42 49 4E 20 D0 44 49 46 46 45 52 20 D0  COMBIN  DIFFER
40   51 53 4F 52 54 57 20 D0 44 49 53 44 55 4D 50 A4  QSORTW  DISDUMP
50   50 52 4F 43 32 20 20 D4 46 41 43 54 4F 52 20 D0  PROC2   FACTOR
60   51 53 4F 52 54 4E 20 D0 54 55 4E 45 20 20 20 D4  QSORTN  TUNE
70   50 52 4F 43 31 20 20 D4 46 52 45 45 20 20 20 D0  PROC1   FREE
80   47 52 45 45 4E 20 20 D4 43 4C 4F 43 4B 20 20 D4  GREEN   CLOCK
90   67 75 74 32 20 20 20 24 52 43 41 54 20 20 20 A4  gut2   $RCAT
A0   50 52 4F 43 30 20 20 A4 00 00 00 00 37 F8 33 20  PROC0       7 3
B0   00 00 00 00 37 F8 33 20 00 00 00 00 37 F8 33 20      7 3     7 3
C0   00 00 00 00 37 F8 33 20 00 00 00 00 37 F8 33 20      7 3     7 3
D0   00 00 00 00 37 F8 33 20 00 00 00 00 37 F8 33 20      7 3     7 3
E0   00 00 00 00 37 F8 33 20 00 00 00 00 37 F8 33 20      7 3     7 3
F0   00 00 00 00 37 F8 33 20 00 00 00 00 37 F8 33         7 3     7 3
```

Figure III: Slave's disc sector editor

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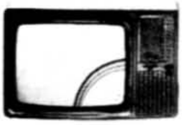
NORDMENDE



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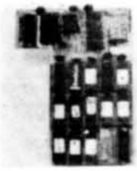

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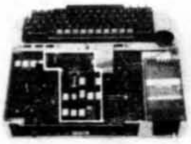

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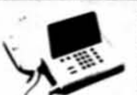

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PASCAL on the p-SYSTEM

AN increasing number of versions of the Pascal programming language is becoming available for the BBC Micro – Acornsoft alone market three different ones.

By ROWAN MALIN

Along with this diversity there is a considerable variation in price, with systems ranging from under £20 to ones costing nearly £300.

This range of systems presents a bewildering choice to the customer wishing to implement Pascal on his or her micro.

This review looks at the Pascal supplied with Acornsoft's UCSD p-System, which comes in at the high end of the price range, being sold for £299.

The p-System was designed initially as a friendly environment in which to develop programs on micros, making full use of the features offered on such machines to make the man-machine interaction as simple and speedy as possible.

Thus output is aimed specifically at VDUs and input is mostly by means of menu-driven single-stroke commands.

In order to make the system as portable across as many micros as possible, it was designed to run on a machine which didn't exist . . .

To make the system run on a real machine all that is needed is a program – called an interpreter – which simulates the behaviour of the pseudo, or p-machine, on the real machine.

The UCSD p-System uses this concept to provide an entire operating system in p-code, the code which runs on the virtual p-machine.

This includes all the usual utilities such as compilers for various languages, a filing system, editors, a linker, a debugger and so on.

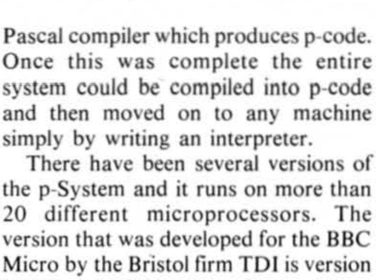
Most of these are not actually programmed directly in p-code, which is very much like any other assembly language, but instead are written in Pascal.

The first to be written was in fact a Pascal compiler which produces p-code. Once this was complete the entire system could be compiled into p-code and then moved on to any machine simply by writing an interpreter.

There have been several versions of the p-System and it runs on more than 20 different microprocessors. The version that was developed for the BBC Micro by the Bristol firm TDI is version IV.12, one of the most recent ones.

The system comes in a stiff cardboard box. Inside are to be found three softback manuals, a wallet containing two single-sided 80-track discs and a card which can be returned to TDI in order to register with the customer support department and for software maintenance.

Customer support is apparently free for the first 90 days and software maintenance for the first year after registration. After that you have to pay.



I had occasion to try out the customer support during the course of this review. My query couldn't be answered directly and I was promised a return phone call which didn't materialise. I would have expected a somewhat better response in view of the nature and cost of the package.

The operating system and Fortran manuals are reprints of the original p-System manuals which are issued by SofTech Microsystems, who have been the licensees of the UCSD p-System since 1980.

The Pascal manual is a well-known reference for UCSD Pascal by Randy Clark and Stephen Koehler.

All of the manuals have been re-bound with glossy covers emblazoned with an Acornsoft/TDI logo. However, for the Fortran and Pascal books that is the only hint that they have anything at all to do with the BBC Micro.

The situation is not much better with the operating system manual, where there is a bare 73 pages of BBC-specific information which looks as though it has been hastily tacked on to the end. This section is in a different typeface and lends an amateurish feeling to what should be a professional product.

The two discs that comprise the system come in the familiar plastic wallet and both are equipped with write-protect tabs.

These discs are only ever used once, on first installing the system on to your own discs, and can then be put away in a safe place. They are not copy-protected in any way.

In order to install and run the system you will need a BBC with a 6502 second processor and at least one single-sided 80-track disc drive. The system can be installed for any combination of disc drives and sizes, although in practical terms a double drive is a necessity for

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From Page 115

doing any program development.

Installation is a time-consuming and complex process, especially if you want to change any of the defaults such as drive configuration or screen mode on power-up.

The process is fairly well described in the installation notes, but is certainly not recommended for the novice user.

My initial attempts to boot the system met with failure, the cause of which was eventually traced to some of the ROMs in my machine. The system also appeared to corrupt the contents of sideways RAM.

These will probably not pose too many problems for the typical user who will probably not want to run anything other than the p-System on his or her machine.

The first thing you notice on booting the system from the master discs is the length of time it takes – it is well over a minute from pressing Shift+Break until the system can be used. This speeds up somewhat on a configured version, but it still takes around 40 seconds.

Again, this may not be much of a handicap if all the machine is used for is running the p-System, which will then just need to be booted once.

Once booted, the main promptline appears which, with a single keystroke, gives you the chance to edit, run, file, compile, link, execute, assemble, debug, halt, initialise, restart or enter the monitor.

Unfortunately, TDI does not bundle the linker, assembler or debugger with its p-System package, although they are available at extra cost as the Advanced Development Toolkit, which also contains some other p-System utilities missing from the original package.

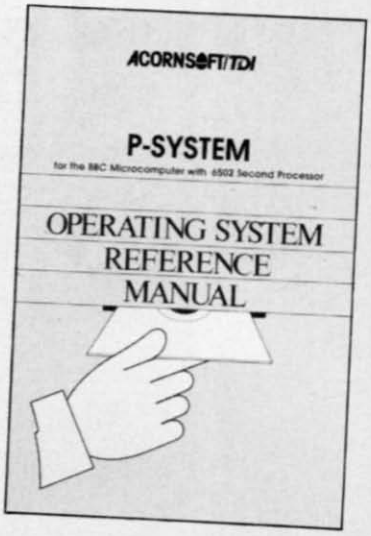
The omission of the symbolic debugger especially is a serious blow to the program developer.

Typing E to enter the editor presents you – after much whirring from the disc drives – with another line of commands which are specific to the editor, allowing you to insert, delete, find, replace, copy and so on.

It is a screen-oriented editor specifically designed for program development and after an initial acclimatisation period becomes quite straightforward and pleasant to use.

Once your masterpiece has been typed into a file using the editor it may be compiled and executed by typing R when the main promptline is displayed.

This is where the beauty of the p-System's integrated nature can be appreciated.



ACORNSOFT/TDI

P-SYSTEM

for the BBC Microcomputer with 6502 Second Processor

OPERATING SYSTEM
REFERENCE
MANUAL

The system maintains what is known as a work-file, which is the file you are currently working on. Should there be any syntax errors in your program you can be put back into the editor with the cursor on the offending line of the work-file, which can then be corrected and re-submitted for compilation with a couple of keystrokes.

After a successful compilation the work-file can be executed simply by typing X.

Note that in contrast with the ISO-Pascal system these work-files are disc-resident and so are not restricted by memory constraints.

The Pascal compiler that comes supplied with the p-System represents a powerful tool for program development on micros. It does not conform very closely with the ISO standard for Pascal, although there are moves afoot to try and bring it into line.

It does, however, contain a very large number of extensions to the standard language which make it well suited to use on a micro.

These include a useful array of string-handling capabilities, a form of concurrency for parallel processing and facilities for splitting programs into a number of segments which can be swapped in and out to disc.

This latter ability, together with the possibility of chaining programs, enables large systems to be put together in a very structured modular fashion – the p-System itself is a good example of this.

This does mean of course that more time is spent accessing the disc. Combine this with the fact that the p-System is not inherently very quick and you end up with a system which won't win any prizes for speed.

Whether the great advantage of being able to write large programs outweighs this depends very much on the application.

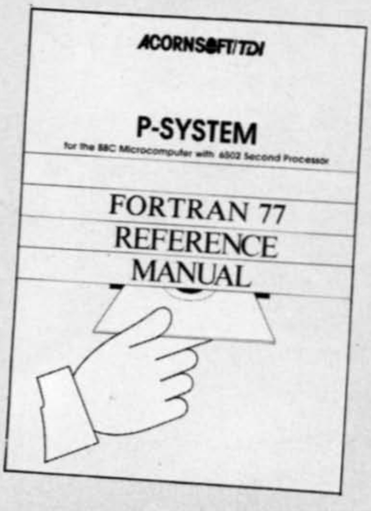
Other extensions which should prove useful to the BBC Micro user are two units – separately compiled chunks of code – called BBCUnit and BBCGrafix, which allow programs to make use of the micro's operating system and VDU routines.

This would allow, for example, a program to be written to transfer files in Acorn DFS format to the p-System, a utility that suprisingly is not supplied in the package.

In addition to the p-System itself and the Pascal compiler, there exist on the supplied discs a Fortran compiler and a utilities program. Fortunately these were outside the scope of this review as I could not get the Fortran compiler to work at all, even after educated guesses had been made as to which file was which since the names did not agree with those given in the manual.

Despite the above comments, the Acornsoft/TDI p-System should have a future. If the documentation is improved and the teething problems removed a good professional product should emerge with scope for many applications.

The UCSD p-System is a good system providing portability and a well thought out programming environment. For the moment, though, especially for the hobbyist, Acornsoft's ISO-Pascal is probably a better route to Pascal on the BBC Micro.



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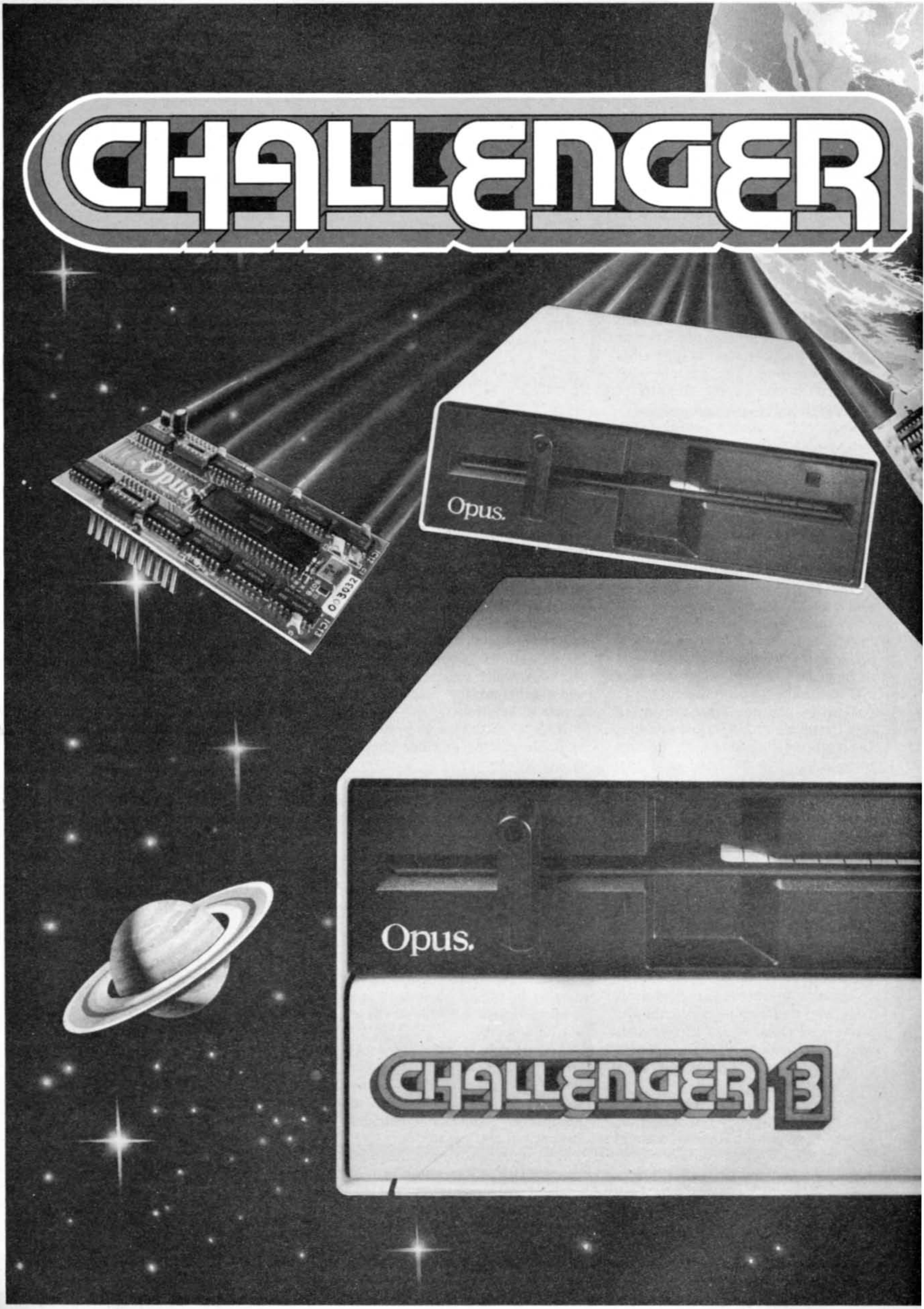
P-SYSTEM

for the BBC Microcomputer with 6502 Second Processor

FORTRAN 77
REFERENCE
MANUAL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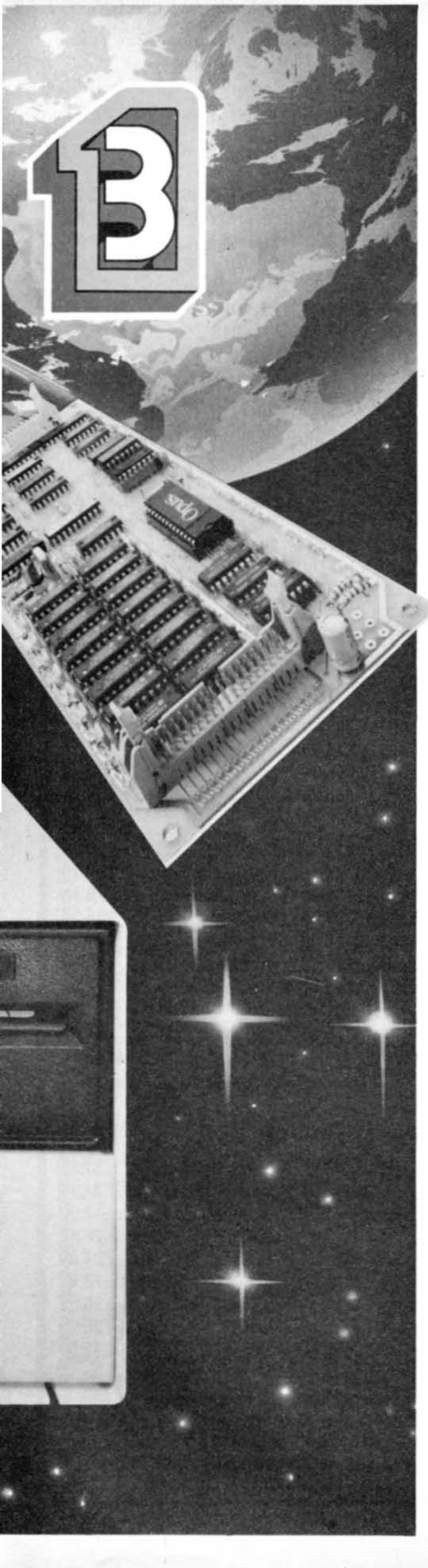

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PROBLEM PAGE

Your technical queries answered by MIKE COOK

A cure for your headaches

I'M writing to tell you of a little bug I found in the hardware side of my BBC Micro which may be causing headaches to other readers.

I discovered it as I was installing the DFS on my upgraded model A machine (issue 4 board, bought December 1982).

The micro was apparently getting no index pulses from the drive, which worked perfectly on another BBC.

It turned out that the pull-up resistor (R58) was in fact 10 ohms instead of 150 (as suggested in the Advanced User Guide diagram) and once the correct value was installed everything did work.

You may also be interested to hear of our attempts at local area networking using the RS423 and Commstar.

A friend and I have directly connected our machines (with 6 core UNscreened cable) from my house to his – a distance in excess of 300 metres.

While Commstar suggests 20m as a maximum, we find that this works without any hassle at 96000 Baud (the highest available).

I think this says a lot for the quality of the machine. – *A.J.P. McMaster, Lisburn, Co. Antrim.*

● **Thanks for the tip. As to the RS423, this is specified to work up to 1000 meters if you use the correct cable.**

Back up the discs

I HAVE an early BBC Micro with upgraded 1.2 OS and an Acorn DFS 0.9 with a 40-track Teac disc drive.

I have never had a load or save fault occur while loading programs, but if I use a disc sector editor to read or write sectors then I get disc error &18 coming up every now and then.

The sector is then unreadable and the disc has to be reformatted to clear it.

I have tried two makes of disc sector editors (one on ROM) but it still occurs at random on both reading and writing to the disc.

Can you or your readers throw any light on this problem? – *R.P. Dennis, Mansfield, Notts.*

● **Yes, I get this problem as well. It is due to the different speeds of the disc drives used for reading and writing. I have even encountered it using the same drive.**

It is caused by slight changes in timing causing the sector to be rewritten slightly later or earlier. This overwrites the end of the previous sector or start of the next one.

The moral is to always back up your discs before editing sectors.

The non-stop 'tot'

I HAVE a BBC Micro with an Opus 3in disc drive and Watford DFS which I bought in January, 1984, when in the UK. I have since returned home to Malaysia.

I have just started using the micro after a two-month break, during which I kept it in the Watford's briefcase.

Usually when you switch on the BBC Micro it will sound "tit-tot". But in my case the micro sounds a continuous "tot" and nothing appears on the screen.

In simple words, I cannot use the micro.

It worked perfectly when I switched it on after arriving back from the UK, thus eliminating any fault caused by mishandling.

Does the hot weather, plus high humidity, especially keeping it in the briefcase, affect the ICs? – *Ismail Yahya, Selangor, Malaysia.*

● **A continuous tone means that the computer is not working and it could be just about anything.**

It is not the heat, but it could be the humidity. What causes chips to fail is the ingress of moisture up the leads. This then corrodes the connecting wires inside the IC.

However, I think that something has worked loose and was just making intermittent contact, that's why it worked at first.

Test the keyboard ribbon cable and all the power connectors – they are usually the culprits.

If it's anything more complex, then it needs looking at with test equipment to tell what is wrong.

You win – but lose

I OWN a BBC Micro and have just acquired an old Teletype printer. I would like to connect the two, but have discovered that the BBC does not have 110 baud rate available.

A friend of mine suggested the following mod. Can you tell me if this will work, as it has not been tested?

Swap link S28 from base baud select, to 1200 baud select. Then use *FX81 to set 75 baud.

The output should now be 108.333 baud!

Is this close enough? – *A.J. Spray, Bispham, Blackpool.*

● **Yes, it will work, but you will lose the ability to load programs from tape.**

Answer – a move

MR SCHOFIELD'S letter in your February issue prompted me to write about the "missing sector" or "Disc Error 18 at 00/00".

This has happened to me quite a few times and I turn the disc centre hub until the timing hole lines up with the holes in the disc envelope, and no more trouble with that disc.

I hope that no-one has thrown a disc away with that problem! – *T. Burden, Redruth, Cornwall.*

● **The fact that you line up the hole is irrelevent. Just moving the disc in the envelope will be sufficient.**

Sometimes closing the drive door when the motor is running will centre-up the disc. I had assumed Mr Schofield knew this, but thanks for pointing it out.

Hunt for a board

IN the December, 1984, issue of *The Micro User* you refer to an add-on board called Pluto, available from I/O Research Limited, London.

I have been trying to find the telephone number and/or address of this company, but without success. – *R. Abel, Bury.*

● **I/O Research Ltd can be contacted on 01-959 0106 or at 6, Laleham Avenue, London NW7 3HL. Contact Mr L Noble. As it is a fast-growing company, it keeps moving into larger premises. This is Mr Noble's home number that they used for the company for some time, so ring outside office hours.**

Question of touch

WHEN I was using a friend's BBC Micro I noticed a marked difference in the feel of the keyboard.

My keyboard is stiff and clicks when a key is depressed, while my friend's is springy and soft. This means that his keyboard is better to use and does not give off the annoying rattle.

As my computer is only just over a year old I do not believe the rattle is due to age.

Could you tell me if there is any way to rectify this, like

→

IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 153.

From Page 121

placing felt pads under the keys. – *Geoff Bispham, Worstead, Norfolk.*

● No, you're stuck with it. I have noticed that there are about three different types of keyboards used – it depends upon where they were made. Needless to say I like some better than others.

Einstein poser

I HAVE an Einstein computer with single disc drive. Included with the machine is Crystal Basic and BBC Basic.

Is it possible to input the large range of BBC/Electron software available through a tape recorder into the Einstein's memory, thereafter saving to disc and modifying program from listings as necessary? – *G. Baker, Plymouth.*

● I do know of someone who has ported BBC software across using the serial ports of each machine. However, he reports that while the programs have been successfully transferred they will not run.

I have had no experience of using the tape port, but I strongly suspect it is the same story. If the program contains any machine code at all it definitely will not run.

Could be anything . .

I HAVE a BBC with issue 2 board and have purchased a Watford DFS and Cumana disc drive.

Having fitted the kit, following January 1984 Micro User as a guide, I now find that although I can call up the DFS on screen and it seems OK, all that happens on the disc drive is that the LED illuminates.

I have cut the back from IC27 and added the extra link. However, zilch! Swapping some of the ICs around does not alter the situation.

What is the error and how can I fix it? – *F. Holmes, Crawley, Sussex.*

● This could be just about anything. If the motor is not coming on, then the drive is not getting the Motor ON line going low. Is this a faulty cable? Is it a faulty buffer? Is it a faulty drive chip? Is it a faulty disc controller? Is it a faulty drive?

All other possibilities can be ruled out by the fact that the light comes on indicating that the drive has been selected.

Without further examination on test equipment it is difficult to say what exactly is wrong. Try connecting your cable round the wrong way at the drive end. The motor should immediately start running. That should eliminate the drive at least.

You're in a corner

I HOPE to buy a disc drive and DFS upgrade kit. I have already decided that I need a dual 80 track drive, but I am considerably confused by the range of DFSs that are available.

My priorities are:

- Acorn compatible – in particular DNFS compatible as the programs I produce at home are transferred to Econet discs at work.
- A larger number of files per disc than the Acorn DFS. I prepare a considerable number of short programs and it would be sensible to have as many as possible on one disc.
- Switchable 40/80 – so eliminating the need for a switchable drive.
- Single/double density.

I have studied the specifications of several DFSs but the jargon, as usual, leaves me cold and of course I am interested in comparison and not just individual specifications. – *Beryl Connelly, Dartford, Kent.*

● I think you have "painted yourself into a corner" with your specifications.

The only Acorn compatible system is Acorn's. If you want more files on a disc these cannot be read by the Acorn system. The same goes for double density.

If you go for a double density system, certain software that writes to the 8271 disc controller will not work.

I am in a similar position of having Acorn DNFS at work and wanting something extra.

I use the Watford single density DFS. This is very compatible with Acorn, switchable in software between 40/80 tracks, and is easy to install – see *Micro User*, January 1984 for installation details in my Body Building Course.

When I take it in to work the Acorn system will only recognise the first 31 files on the disc, and it is best to avoid writing to a disc with extended directory on the Acorn system.

As for double density, if absolute compatibility is required I would forget it. It can never be 100 per cent compatible.

In-and-out problem

I HAVE recently put two 6264 8k RAM chips into sockets 15L &15H of my Watford Electronics ROM socket board. I have also closed link 1 on the board.

How do I put things into this RAM area, and secondly how can I then get them out again?

I am a newcomer to sideways RAM uses and so would welcome any comments.

I am developing some Radio RTTY software and wish to load it into the sideways RAM to check operation before committing it to eprom. – *R. Cooke, Diss, Norfolk.*

● You put things into this area by simply storing at address &8000 to &BFFF. To run a program stored in sideways ROM or RAM you issue the appropriate * command.

The sideways program must recognise this call is meant for it and take appropriate action.

A full discussion of the workings of this is given in the Advanced User's Guide.

Not so simple . .

COULD I connect a British Telecom Puma telex with a BBC Micro? And if so, what uses would it have? – *Jamie Shawyer, Hatfield, Herts.*

● The simple answer is "Not very easily". The telex system works on a different code to your computer.

The computer uses Ascii and the telex uses ICCTT code No. 2. This is a 5 bit code as opposed to the 7 bit Ascii code.

What you would have to do is to write a code conversion patch and re-route your printer vector through this. Then you would need to boost the signal from the RS432 port into something like +−80 volts.

Also you need to know if the printer is working on 50 baud or 75 baud. The BBC cannot be made to run on 50 baud and so you would have to build a special serial adapter for the 1mHz bus. In short I think it would be easier and cheaper if you got a compatible printer.

I get interference

IS there anything I can do to stop my BBC Micro from interfering with my VHF cassette/radio?

Would an external aerial help – costs £40 – or would disabling the RF modulator in the micro cure it? – I assume that's the cause and I use RGB output.

And can I run the micro from a 12 volt car battery? If so, what connections and so on would I need to make a change? – *M.J.S. George, Bristol.*

● Interference by the computer to radios is not caused by the video modulator but by the whole operation of the computer.

The only remedy is to fit a good screened outside aerial to the radio, although in weak reception areas this still will not work satisfactorily.

To run the computer from 12 volts you would need a series 5 volt regulator rated at 5 amps. All the leads to the existing power supply need to be disconnected.

Regulators like this are a bit tricky to build but it can be done. They are not available commercially as far as I know.

You have no need for the −5 volt supply if you do not need sound or the serial output.

If you have discs the disc will also need a +12v supply.

The other alternative is to use a voltage inverter like those used with caravans, but I do not know how the switched mode power supply would like that.

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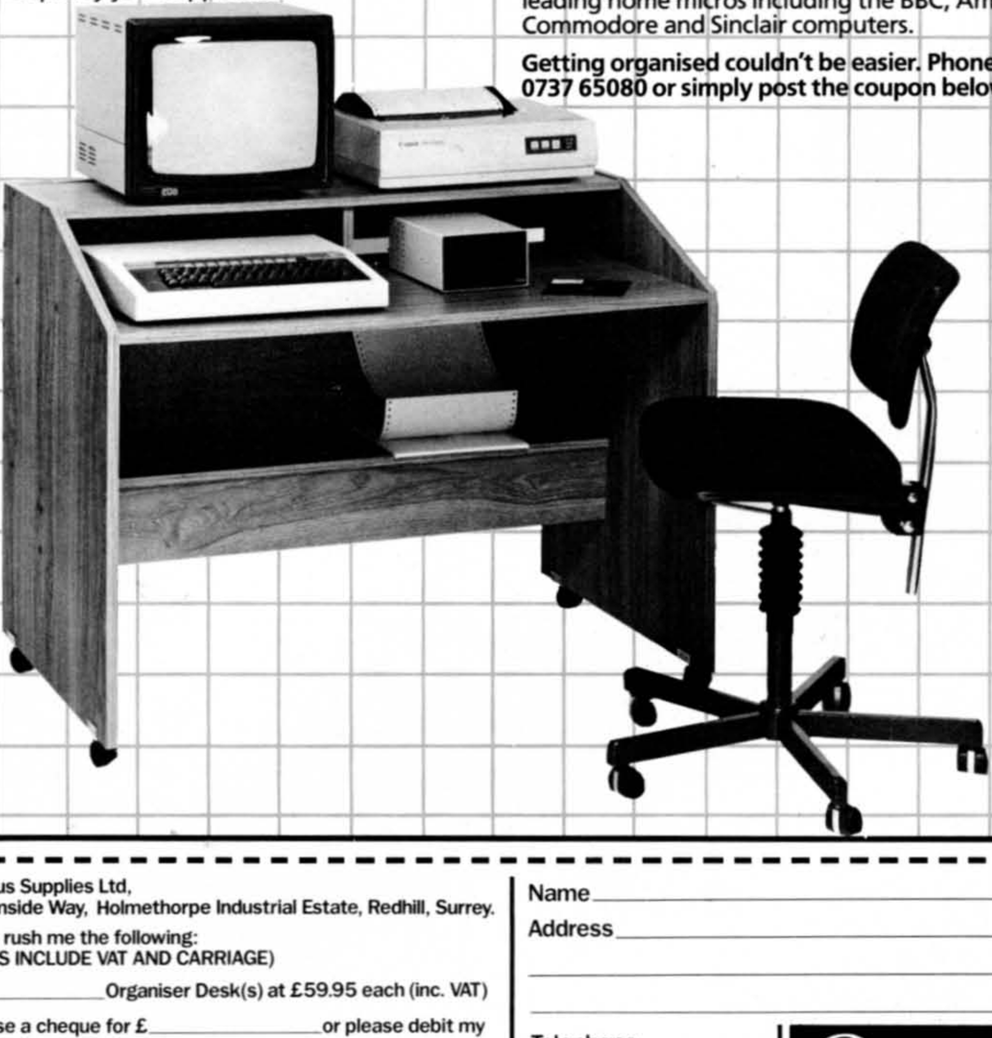

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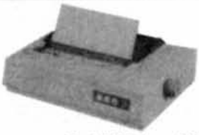

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THE BEEB BODY BUILDING COURSE

Part 31

MIKE COOK has an elegant hardware method of making 80 track drives live happily with 40 track discs

Downgrading your system? Yes, it can make sense

THIS month we look at the first downgrade you can make to your computer system – that is apart from emulating a Spectrum on it. At a stroke we will halve the capacity of an 80 track drive. So why read on?

Well, the BBC Micro is capable of operating with 40 or 80 track disc drives. This can lead to certain incompatibility problems between the two formats.

If you are programming in Basic these can easily be overcome by fitting a Watford DFS which allows you to double step an 80 track drive so that it can read 40 track discs.

However certain commercial software needs to be started with a Shift+Break which will undo the double stepping command. In certain circumstances this can be circumvented by using *EXEC !BOOT or *RUN !BOOT.

But certain copy protection methods involve the changing of vector tables that will negate the effect of the double stepping software patch. The simple solution is to purchase a 40/80 track switchable drive, but if you have already bought an 80 track drive you are stuck.

As all drives are very different inside it is impossible to give details of how to convert them even were it possible, and another solution has to be sought.

This dilemma was faced by one of our readers, a Mr John Dowden in Australia. To solve it I came up with a hardware solution. By interposing a circuit between the computer and the disc drives we can make the drive think it is being given double pulses by the computer.

In essence, what we want to do is quite simple. Every time the computer tells the drive to move (step) to the next track we sneakily throw in an extra pulse so that it moves on two tracks.

When we do this, however, the drive will be receiving pulses at twice the normal rate.

The BBC Micro allows us to select the speed of stepping by means of a row of links on the right hand corner of the keyboard printed circuit board – see Figure I and Table I.

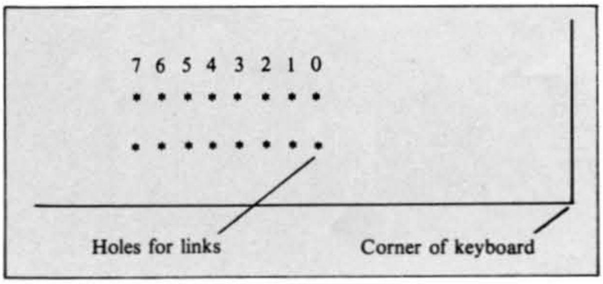

Figure I: Keyboard link area

The two links that control the disc drive delay times are 4 and 5. With these links unmade the stepping rate is one pulse every 24mS. If you make link 4 the drive will be stepped at a rate of 6mS.

Try this, and if your drive works at this speed it is suitable for use with this month's circuit. Note that links 4 and 5 must be unmade when this circuit is connected.

What our circuit needs to do is shown in Figure II. The normal step rate *Ts* needs to be set at 24mS, then on each step pulse, after a time *Td* (12mS) we need to generate another pulse.

The pulse width *Tw* needs to be about 20uS. These two sets of pulses need to be mixed together and sent to the disc drive. In essence we have to generate the time delays *Td* and *Ts* and the simplest way to do this is with a monostable.

A monostable is not a home for a single horse but a circuit capable of

➡

210	Give the mode in binary when break or power up. Link made =0 link unmade =1. For Mode 5 (101) make link 1.
3	Controls auto start. Unmade: Auto execute on Shift+Break. Made: Auto execute on Break or Power up.
5 4	Controls disc controller delay rates.
7 6	Unused.

Table I: Keyboard link options

From Page 125

changing an edge into a fixed width pulse. The 74LS123 is an integrated circuit containing two monostables – a sort of stereostable!

In Figure III you can see one half of this device. It is shown being triggered by a positive edge – that is, with the logic change from zero to one, sometimes called a rising edge.

The monostable also has another input that will trigger it off a falling edge, but we do not need that one for this circuit. Once an edge has occurred the monostable will fire and produce a pulse of fixed width. The width of this pulse, *T*, is determined by the values of an external resistor and capacitor. There are two outputs, *Q* and *Q* bar. As you can see, they are the complement of each other.

After the monostable has finished its pulse it is ready to be triggered by another edge. There are two types of monostables – a one shot and a re-triggerable. Once the one shot has fired any further edges at the input have no effect on the duration of the pulse. On the other hand a re-triggerable monostable starts the time delay again if any edges occur during the firing pulse.

In other words the pulse is extended until a time *T* has elapsed since an edge. The 74LS123 is a re-triggerable monostable, but we will not be using this property in our circuit. We can therefore use monostables to generate the time delay *Ts* and the pulse *Tw* we saw in Figure I.

Nothing is quite as simple as it first appears, and there are occasions when we do not want to add this extra pulse. For example, it would be nice to be able to switch drive 0 and drive 1 independently.

If one drive were switched to 40 tracks and the other to 80 tracks then you could simply backup a 40 track disc onto an 80 track disc. No prizes for guessing why you can't backup an 80 track disc to a 40 track disc, but you can copy files.

We have to see which drive is being accessed and only throw in our double pulse if it is the drive we want.

Another problem could occur when switching over from 80 tracks to 40 tracks. When searching for track 0 to read the directory the disc controller chip simply throws out "step out" pulses until it detects that the head has reached track zero. This is detected by a micro switch or a photo detector.

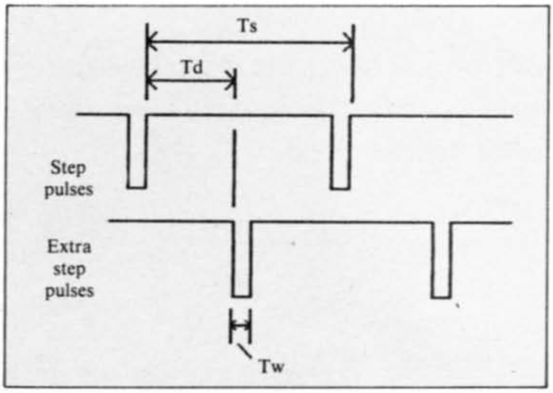
Ts
Td
Step pulses
Extra step pulses
Tw

Figure II: Extra pulses

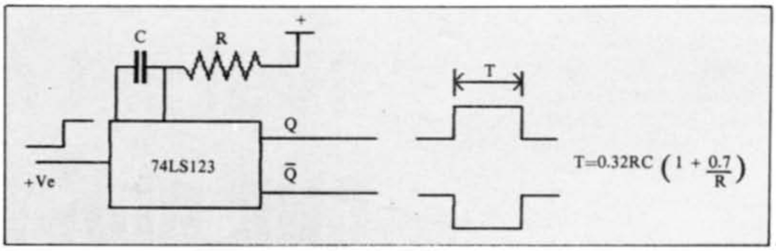
C
R
+
T
Q
Q̄
74LS123
+Ve
T=0.32RC (1 + 0.7/R)

Figure III: A monostable

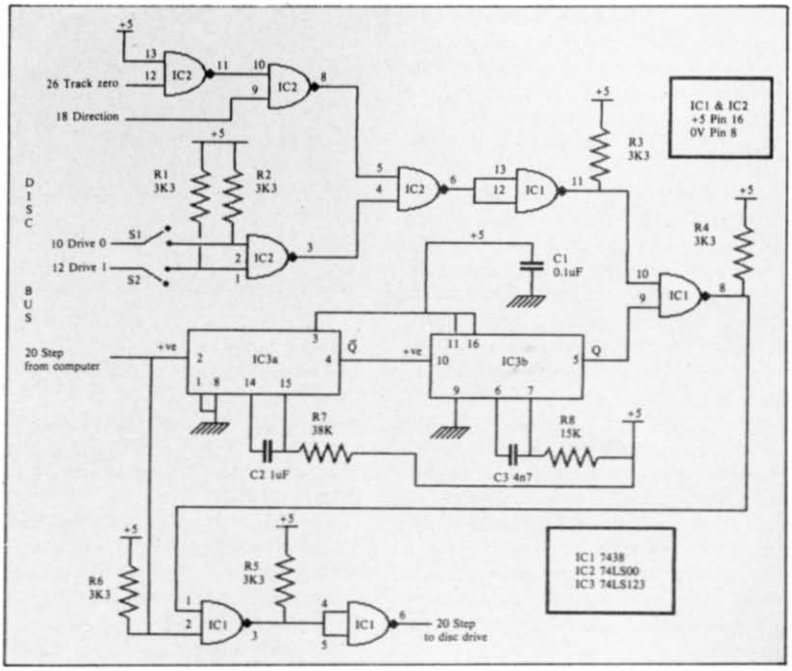
+5
13
12
IC2
11
10
9
8
26 Track zero
18 Direction
DISC BUS
R1 3K3
R2 3K3
S1
S2
10 Drive 0
12 Drive 1
2
1
3
5
4
6
R3 3K3
IC1 & IC2
+5 Pin 16
0V Pin 8
IC1
R4 3K3
C1 0.1uF
20 Step from computer
+ve
IC3a
Q̄
IC3b
Q
11 16
1 8 14 15
9 6 7
R7 38K
C2 1uF
R8 15K
C3 4n7
R6 3K3
R5 3K3
IC1 7438
IC2 74LS00
IC3 74LS123
20 Step to disc drive

Figure IV: 80/40 disc switcher

Suppose we are on an odd numbered track, say track 1. The computer issues a pulse and it steps back to track 0 and our circuit issues an extra pulse and the head goes past track 0. This could cause difficulties or even damage to the drive. We don't want to give an extra pulse when we are at track zero, but it's not as simple as that because when stepping in from track zero we want an extra pulse. Therefore we only want to inhibit our extra pulses when the head is at track zero and we are being told to step out.

With that sorted we can now go on to look at our circuit. The 80/40 disc switcher is shown in Figure IV. It goes between the computer's disc output and the disc drive's input.

All lines except the step line go directly from the computer to the drive where they are needed to drive our circuit – we simply tap them off.

The step line (pin 20) is broken, and redirected as shown. From the computer it goes to the +ve input of the first monostable IC3a and also through two gates of IC1 to be passed on to the disc drive.

The step pulse triggers the first monostable and when it times out the second one is triggered, producing our extra pulse. The pulse then passes through a gate and on to be mixed with the original step signal.

If we do not want a pulse, our extra pulse is stopped at the first gate by the application of a logic zero on pin 10 of IC1. This can occur if the direction line is at 1 and the track zero detector is at a 0.

The pulse is also stopped if there is no logical zero on pins 1 or 2 of IC2. These are connected to the drive select lines through switches. If the switches are open no double pulsing will occur. However if switch SW1 is closed double pulsing will occur only when drive 0 is being used, as the signal "Drive 0" will be at a logic zero on these occasions.

R1 to R6 are pull up resistors and are needed because the 74LS38 has an open collector output. Open collector outputs will only pull down to logic zero, they will not pull an input up.

To pull up inputs you need pull up resistors. These are situated inside the disc drive at the far end of the cable and make for more reliable operation. however we need only one such output – pin 6 IC1 – and so in order to use the other gates in the package we need to use pull up resistors.

The capacitor C1 provides a measure of power supply decoupling. The three integrated circuits doing the work only cost a few pounds but the printed circuit board and all the plugs, sockets and switches account for the bulk of the prices.

All components and a double sided plated through hole printed circuit board is available for this project as Body Build Pack 26 – see panel for details. For those of you with solder phobia the kit is also available ready made.

Construction is simple. Just solder the components to the places indicated on the printed circuit board. Remember to break any links on pins 4 or 5 before installing this board.

The circuit is placed in between the computer and the disc drive. You need to disconnect the disc drive from the computer and plug it into the circuit board. Then connect the circuit board to the computer with a length of 26 way ribbon cable and connectors. These are supplied in the pack and should be made up as shown in Figure V.

The cable is attached to the socket simply by squeezing the two together in a vice. Then it is wrapped over the socket and clamped with the small clip.

Note that Figure V shows the orientation of the sockets *after* the cable has been clamped. This configuration is the reverse of that normally used when connecting Body Build packs to the user port, where both sockets point downwards.

The circuit also needs a small supply of 5 volts to operate. This is taken from the computer's auxiliary power output socket, whose connections are shown in figure VI.

As some disc drives use this socket for their power – a practice I don't recommend – the board has screw terminals to act as a power distribution point so that you can use this board and continue to power your discs, or anything else. The current taken by the board is negligible and so will not overload the power supply significantly.

Note that when you are double stepping an 80 track drive to use 40 tracks the head will only pick up half the track.

This is OK for reading a 40 track disc and for writing to a previously blank freshly formatted disc. However you could have trouble if you are using a double stepped 80 track drive to overwrite information that has previously been put on by a 40 track drive.

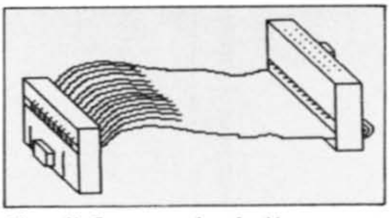

Figure V: Computer to board cable

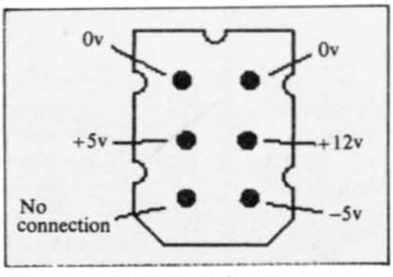

Figure VI: Aux power supply connector

The recording head on a 40 track drive is twice as wide as an 80 track drive, so what will happen is that half of the track will contain the new information and half the track width will contain old information.

This is all right if you continue to use a double stepped 80 track drive but if you then try to read it on a 40 track drive you will read half the old information and half the new information. The result is that the computer will not be able to make sense of it.

This isn't peculiar to this circuit, it applies to all switchable drives and software double stepping.

No software this month, as this is totally a hardware solution. It should work with all makes of drive that can stand being stepped at 12 mS, which means most of them.

It should also work with any "fancy" double density system that is installed. So now you can have a switchable drive without having to trade in your 80 track drive. See you next month.

Component list for Body Build Pack 26: **1 Double-sided plated-through holes PCB, 3 ICs and sockets, 8 resistors, 3 capacitors, 2 PCB mounting switches, 2 26-way IDC sockets, 2 26-way IDC plugs, 1ft 26-way ribbon cable, 1ft 4 core cable, 1 aux power supply plug, 1 screw terminal block.**

Pack 26 is available from Musbury Consultants, 8 Fairhill, Helmshore, Rossendale, Lancs. BB4 4JX. Price £32 inc. VAT + p&p. Ready assembled £37. Foreign orders add £3 for air mail. Educational and Government establishments' orders accepted.

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GRAEME WILLIAMS takes the witness stand to give evidence in . . .

The CASE for improving ON GOTO/GOSUB

FOR ages I've wished that the ON GOTO/GOSUB statement included the option to call a procedure instead of a line number, the only alternative being a series of endless IF ... THEN ... ELSEs

So, armed with Mark Plumbley's book, Basic ROM User Guide, I wrote a command to do just that. The CASE statement – because of its similarities to the Pascal CASE statement – has a similar syntax to the ON statement.

The BNF definition – as used in the BBC User Guide – is:

```
CASE <num-var> THEN <Proc statement> {
,<Proc statement>} [ELSE <statement>]
```

So if you type in the following line of Basic:

```
FOR A%=1 TO 3:CASE A% THEN PROC_A,PROC
_B,PROC_C:NEXT
```

when *A%* equals one the CASE will perform PROC_A, similarly when *A%* is two the CASE performs PROC_B and performs PROC_C when *A%* equals 3.

Program I shows the code for this and an example of the use of the CASE statement. It takes up just less than one page of memory – I chose &B00 for this.

When first assembled you should CALL &B00 to alter the break vector to point to the code – this is already done in the program.

The following is a breakdown of how it works:

1. If error isn't *Mistake* – error code 4 – it goes to the original break handler.
2. If the *Mistake* was not caused by the new keyword CASE then control is passed to the original break handler.
3. CASE has now been recognised so the error information is removed from the stack.
4. Evaluate the <numeric>.
5. Check that the next character is the THEN token. If it isn't, error 60 occurs with message *CASE syntax*.
6. If the <numeric> was less than 1 or greater than 255 go to step 9 else count along the line to find the entry corresponding to the <numeric>.
7. Check that next character is the PROC token. If it isn't then error 13 occurs with message *no PROC*.
8. Execute procedure. Find the end of the statement and pass control back to Basic to continue execution of the program.
9. If correct entry was not found, then check to see if the ELSE token is present. If so, then control is passed over to the ELSE routine, otherwise error 61 occurs *CASE range*.

The following are the new errors that can occur by the misuse of CASE:

CASE syntax: The THEN token is missing.

no PROC: The entry corresponding to the CASE <numeric> is not a PROC statement.

CASE range: Occurs if there isn't an entry for the <numeric> and there isn't an ELSE statement.

```
   10 REM CASE statement
   20 REM By Graeme Williams
   30 REM (c) The Micro User
   40 IF ?&8015=ASC"1" THEN PROC_basi
c1 ELSE PROC_basic2
   50 FOR A%=0 TO 2 STEP 2:P%=&B00
   60 [OPT A%
   70 .init
   80      lda #newbrk MOD 256 \ Set u
p new break
   90      sta brkv             \ vecto
r.
  100      lda #newbrk DIV 256
  110      sta brkv+1
  120      rts
  130 .newbrk
  140      pha          \ Save A and Y
on stack.
  150      tya
  160      pha
  170      ldy #0       \ Get error num
ber
  180      lda (&FD),Y \ If "mistake"
try CASE
  190      cmp #4
  200      beq mistak
  210 .givup
  220      pla          \ Restore A and
 Y and go to
  230      tay          \ original brea
k handler
  240      pla
  250      jmp BRK
  260 .mistak
  270      lda #case MOD 256   \ (&39)
 = Start of
  280      sta &39              \
  CASE string
  290      lda #case DIV 256
  300      sta &3A
  310      ldy &A       \ (&37) = Chara
cter before
  320      dey          \         PTRA
  330      tya
  340      clc
  350      adc &B
  360      sta &37
  370      lda &C
  380      adc #0
  390      sta &38
  400      ldy #&FF
  410 .nextch
  420      iny           \ Get next char
acter
  430      lda (&39),Y \ execute if CA
SE recognised
  440      beq ok
  450      cmp (&37),Y \ If characters
```

→

Program I

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- ★ Erase; Memory in specified area, ROM control switch and tube memory.
- ★ Display low memory areas.
- ★ Load menu.
- ★ Switch NFS off.
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The CASE statement

From Page 129

```
 match
  460     beq nextch  \ try next one
  470     jmp givup   \ else give up
  480 .ok
  490     dey         \ Adjust offset
 of PTRA to
  500     tya         \ point to firs
t character
  510     clc         \ after CASE ke
yword
  520     adc &A
  530     sta &A
  540     pla         \ Remove A and
Y off stack
  550     pla
  560     pla         \ Remove RTI in
formation
  570     pla
  580     pla
  590     pla         \ Remove return
 address
  600     pla         \ from "=" rout
ine
  610     jsr getsna  \ Get <numeric>
 at PTRA
  620     jsr getfta  \ and get next
token
  630     ldy &1B     \ Adjust PTRA t
o point to
  640     iny         \ character aft
er token
  650     sty &A
  660     cpx #&8C    \ Check that to
ken is THEN
  670     beq OK
  680 .syntax
  690     BRK         \ If not then e
rror
  700 ]?P%=60:P%=P%+1
  710 $P%="CASE syntax":P%=P%+LEN$P%
  720 ?P%=0:P%=P%+1:[OPT A%
  730 .OK
  740     lda &2B     \ If INTA > 255
 or INTA < 1
  750     ora &2C     \ then look for
 ELSE
  760     ora &2D
  770     bne else
  780     ldx &2A
  790     beq else
  800     dex         \ If INTA = 1 t
hen execute
  810     beq found   \ first proc
  820     ldy &A
  830 .loop
  840     lda (&B),Y  \ Find next pro
c
  850     iny         \ if end of sta
tement
  860     cmp #&D     \ then look for
 ELSE
  870     beq else
  880     cmp #&3A
  890     beq else
  900     cmp #&8B
  910     beq else
  920     cmp #&2C
  930     bne loop
  940     dex         \ If not proc r
equired
  950     bne loop    \ find next one
  960     sty &A      \ Adjust PTRA
  970 .found
  980     jsr getcha  \ Get next char
acter
  990     cmp #&F2    \ if not PROC t
oken then
 1000     bne prcerr  \ error
 1010     lda &B      \ PTRB = PTRA
 1020     sta &19
 1030     lda &C
 1040     sta &1A
 1050     lda &A
 1060     sta &1B
 1070     lda #&F2    \ Execute PROC
 1080     jsr exeprc
 1090 .loop2
 1100     lda (&19),Y \ Find end of s
tatement
 1110     iny
 1120     cmp #&D
 1130     beq end
 1140     cmp #&3A
 1150     bne loop2
 1160 .end
 1170     dey         \ Adjust PTRA t
o point to
 1180     sty &A      \ delimiter
 1190     jsr chksda  \ Check end of
statement
 1200     jmp cont    \ continue exec
ution
 1210 .prcerr
 1220     jmp noproc
 1230 .else
 1240     ldy &A      \ Go back to TH
EN token
 1250 .loop3
 1260     lda (&B),Y  \ If ELSE token
 then execute
 1270     iny
 1280     cmp #&8B
 1290     beq elsfnd
 1300     cmp #&D     \ If not end of
 line then
 1310     bne loop3   \ check next ch
aracter
 1320     BRK         \ No ELSE in li
ne
 1330 ]?P%=61:P%=P%+1
 1340 $P%="CASE range":P%=P%+LEN$P%
 1350 ?P%=0:P%=P%+1:[OPT A%
 1360 .elsfnd
 1370     sty &A      \ Adjust PTRA t
o after ELSE
 1380     jmp exelse  \ goto ELSE rou
tine
 1390 .case
 1400 ]$P%="CASE":P%=P%+LEN$P%
 1410 ?P%=0:P%=P%+1:[OPT A%
 1420 ]
 1430 NEXT
 1440 IF &FFFF AND!&202<>newbrk THEN
CALL init
 1450 MODE 2:PROC_example:END
 1460 DEF PROC_basic1:REM BASIC 1 loc
ations
 1470 brkv   = &202  :REM break vecto
r
 1480 BRK    = &B433 :REM basic BRK h
andler
 1490 getsna = &9AF7 :REM get <numeri
c> at PTRA
 1500 getfta = &92A1 :REM get <factor
>
 1510 getcha = &8A1E :REM get charact
er at PTRA
 1520 exeprc = &B1C6 :REM execute PRO
C
 1530 chksda = &9810 :REM check end o
f statement
 1540 cont   = &8B0C :REM continue ex
ecution
 1550 noproc = &931E :REM "no PROC" e
rror
```

→

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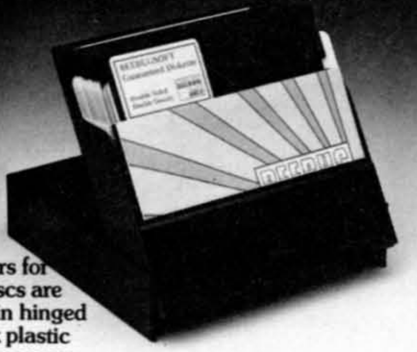

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BEEBUG SOFT

The CASE statement

From Page 131

```
 1560 exelse = &98B4 :REM execute ELS
E
 1570 ENDPROC
 1580 DEF PROC_basic2:REM BASIC 2 loc
ations
 1590 brkv   = &202  :REM break vecto
r
 1600 BRK    = &B402 :REM basic BRK h
andler
 1610 getsna = &9B1D :REM get <numeri
c> at PTRA
 1620 getfta = &92F0 :REM get <factor
>
 1630 getcha = &8A97 :REM get charact
er at PTRA
 1640 exeprc = &B197 :REM execute PRO
C
 1650 chksda = &9857 :REM check end o
f statement
 1660 cont   = &8B9B :REM continue ex
ecution
 1670 noproc = &9365 :REM "no PROC" e
rror
 1680 exelse = &98E3 :REM execute ELS
E
 1690 ENDPROC
 1700 DEF PROC_example:A$="CPTPCPTTPC
PTT"
 1710 FOR Z%=1 TO LEN A$
 1720 CASE INSTR("PTC",MID$(A$,Z%,1))
 THEN PROC_palette,PROC_triangle,PROC
_circle ELSE STOP
 1730 NEXT:END
 1740 DEF PROC_palette:READ B%:GCOL 0
,B%:ENDPROC
 1750 DEF PROC_triangle:READ A%,B%,C%
,D%,E%,F%:MOVE A%,B%:MOVE C%,D%:PLOT
85,E%,F%:ENDPROC
 1760 DEF PROC_circle:READ A%,B%;C%:M
OVE A%,B%+C%:FOR A=0 TO 2*PI STEP PI/
10:MOVE A%,B%:PLOT 85,A%+C%*SIN A,B%+
C%*COS A:NEXT:ENDPROC
 1770 DATA 640,300,300,1,340,400,940,
400,640,900,7
 1780 DATA 640,900,50,4,400,350,550,3
50,550,300,880
 1790 DATA 350,730,350,730,300,1,640,
250,50,3,640
 1800 DATA 140,640,60,400,250,640,140
,640,60,880,250
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

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Scroller listing

From Page 86

```
   10 REM Scrolling Messages
   20 REM By Michael Mitchell
   30 REM (c) The Micro User
   40 DIM code 1000
   50 cls            = 12
   60 waitVsync      = 19
   70 himem          = &34E
   80 bytesPerRow    = &352
   90 bytesPerScreen = &354
  100 stackSize      = 10*(3+2)
  110 origin         = &FFFF1B00
  120 osrdch         = &FFE0
  130 oswrch         = &FFEE
  140 osword         = &FFF1
  150 osbyte         = &FFF4
  160 vidAddr        = &FE00
  170 vidData        = &FE01
  180 PROCasm
  190 OSCLI"SAVE X.Scroll "+STR$~code
+" "+STR$~O%+" "+STR$~origin+" "+STR$
~origin
  200 END
  210 DEF PROCasm
  220 FOR pass=4 TO 6 STEP 2
  230 P%=&70
  240 O%=code
  250 [opt pass
  260 .cellPtr           EQUW 0     Poi
nter on to the screen
  270 .strPtr            EQUW 0     Poi
nter into the string
  280 .strCsr            EQUB 0     Cur
sor into the string
  290 .attributes
  300 .topBorderCol      EQUB 0     TBC
  310 .backgroundCol     EQUB 0     BGC
  320 .foregroundCol     EQUB 0     FGC
  330 .bottomBorderCol   EQUB 0     BBC
  340 .topBorderHeight   EQUB 0     TBH
  350 .characterHeight   EQUB 0     CHH
  360 .lastAttr
  370 .characterWidth    EQUB 0     CHW
  380 .topOfScreen       EQUW 0     Adr
ress for 6845 of screen
  390 .scrAddr           EQUW 0     Adr
ess of RHS of top row of screen
  400 .bpsDiv8           EQUB 0     Byt
es per screen/8
  410 .colMask           EQUB 0     Mas
k for character column
  420 .charCellRow       EQUB 0     Row
 of current screen cell
  430 .charRow           EQUB 0     Row
 in current character
  440 .tempCol           EQUB 0     Tem
porary for fill byte
  450 .colCount          EQUB 0     Cou
nter for column width
  460 .currentRow        EQUB 0     Row
 on screen 0-255
  470 .overflow          EQUB 0     Thi
s is -ve if >256 attempted
  480 .sp                EQUB 0     Sta
ck pointer for FORs and JSRs
  490 ]
  500 O%=code
  510 P%=origin
  520 [ opt pass
  530   jsr init
  540   jsr dispString
  550   rts
  560 .init
  570 \ Initialisation procedure
  580 \ This sets up pointer, default
 values for attributes etc.
  590   lda #cls
Clear the screen
  600   jsr oswrch
  610   lda #0
  620   sta strPtr
strPtr low is always zero
  630   sta postChar+1
Make -ve so no postChar routine
  640   dec postChar+1
  650   sta topOfScreen
High byte of this zero after cls
  660   adc bytesPerRow
scrAddr set to last cell on top line
  670   sta scrAddr
which is himem+bytesPerRow-8
  680   lda himem
  690   tax
  700   clc
  710   adc bytesPerRow+1
  720   sta scrAddr+1
  730   txa
topOfScreen starts at himem/8 as it i
s
  740   lsr A
the address sent to the 6845
  750   lsr A
  760   lsr A
  770   sta topOfScreen+1
  780   sec
Do the minus eight bit on scrAddr
  790   lda scrAddr
  800   sbc #8
  810   sta scrAddr
  820   lda bytesPerScreen
This is a constant used to upadte
  830   lsr A
the value in topOfScreen after scroll
ing
  840   lsr A
  850   lsr A
  860   sta bpsDiv8
  870   ldx #lastAttr-attributes
Set up the default attributes
  880 .setUploop
  890   lda defaults,X
  900   sta attributes,X
  910   dex
  920   bpl setUploop
  930   lda #stackSize-1
Init the stack pointer. Note the
  940   sta sp
sp points to the NEXT item, like the
6502
  950   rts
  960 .dispString
  970 \ This is the main  routine
  980 \ It goes through the string, g
eting characters and obeying
  990 \ them if they are commands or
scrolling them on to the screen
 1000 \ if they are printable.
 1010   lda #strBuffer MOD &100
Init the strPtr/strCsr
 1020   sta strCsr
 1030   lda #strBuffer DIV &100
 1040   sta strPtr+1
 1050 .dispStrLoop
 1060   bit &FF
Check for escape
 1070   bmi endDispStr
 1080   jsr getAttr
Get a byte from the string and set Z
on it
 1090   beq endDispStr
It's zero so end/return from jsr
 1100   cmp #ASC" "
Is it a control char?
 1110   bcs doTheChar
No, so print it
 1120   jsr commandCharacter
Yes so obey it
 1130   jmp dispStrLoop
and do the next character
 1140 .doTheChar
 1150   jsr dispChar
Scroll the character in A on to the s
creen
 1160   lda postChar+1
Are we doing a postChar routine?
 1170   bmi dispStrLoop
No, so loop straightaway
 1180   tay
Yes, so put address of routine in XY
 1190   pha
and save the high byte
 1200   ldx postChar
 1210   sec
```

```
Make the high byte -ve so we don't re
-enter
 1220   ror postChar+1
 1230   jsr jsrAddr1
Jsr the postChar routine
 1240   pla
Restore the high byte of the postChar
 address
 1250   sta postChar+1
 1260   bpl dispStrLoop
and loop
 1270 .endDispStr
 1280   rts
Go home or return from jsr
 1290 .getAttr
 1300   jsr getStrChar
Get a byte from the string in A and X
 1310   tax
 1320   rts
 1330 .getAttrAndN
 1340   jsr getAttr
Get the first byte (attr) in X
 1350  .getStrChar
 1360   ldy strCsr
and fall through to get the next byte
 in A
 1370   lda (strPtr),Y
 1380   inc strCsr
 1390   bne getStrChar1
 1400   inc strPtr+1
 1410 .getStrChar1
 1420   rts
 1430 .commandCharacter
 1440   cmp #(lastCommand-comTab) DIV
 2  Get the address of the ctrl code
 1450   bcs commandCharEnd
No a valid command so return immediat
ely
 1460   asl A
Address is at comTab+2*X and comTab+2
*X+1
 1470   tax
 1480   lda comTab+1,X
 1490   pha
Push it on to the stack
 1500   lda comTab,X
 1510   pha
 1520 .commandCharEnd
 1530   rts
and jump to it using rts
 1540 .setAttrN
 1550 \ The SET command
 1560 \ This sets the attribute numbe
r following the opcode to the
 1570 \ value in the byte which comes
 next.
 1580   jsr getAttrAndN
 1590   sta attributes,X
 1600   rts
 1610 .rstAttr
 1620 \ The RST command
 1630 \ This sets the attribute numbe
r following the opcode
 1640 \ to its default value
 1650   jsr getAttr
 1660   lda defaults,X
 1670   sta attributes,X
 1680   rts
 1690 .addAttrN
 1700 \ The ADD command
 1710 \ This adds a byte value to the
 attribute number which comes
 1720 \ after the opcode. The value t
o add comes after that
 1730   jsr getAttrAndN
 1740 .addAttrN1
 1750   clc
 1760   adc attributes,X
 1770   sta attributes,X
 1780   rts
 1790 .incAttr
 1800 \ The INC command
 1810 \ This adds 1 to the attribute
number given
 1820   jsr getAttr
 1830   inc attributes,X
 1840   rts
 1850 .decAttr
 1860 \ The DEC command
 1870 \ This subtracts 1 from the att
ribute number given
 1880   jsr getAttr
 1890   dec attributes,X
 1900   rts
 1910 .rorAttrN
 1920 \ The ROR command
 1930 \ This rotates an attribute rig
ht by a specified number of places
 1940   jsr getAttrAndN
 1950   tay
 1960 .rorAttrNloop
 1970   lda attributes,X
 1980   ror A
Rotate withOUT carry, so a little
 1990   ror attributes,X
bit involved
 2000   dey
 2010   bne rorAttrNloop
 2020   rts
 2030 .rorAttr1
 2040 \ The ROR1 command
 2050 \ This rotates the specified at
tribute to the right once
 2060   jsr getAttr
 2070   ldy #1
 2080   bne rorAttrNloop
 2090 .rolAttr1
 2100 \ The ROL1 command
 2110 \ This rotates the specified at
tribute to the left once
 2120   jsr getAttr
 2130   ldy #7
 2140   bne rorAttrNloop
 2150 .eorAttrN
 2160 \ The EOR command
 2170 \ This EORs the given attribute
 with the given byte value
 2180   jsr getAttrAndN
 2190 .eorAttrN1
 2200   eor attributes,X
 2210   sta attributes,X
 2220   rts
 2230 .invAttr
 2240 \ The INV command
 2250 \ This inverts the given attrib
ute
 2260   jsr getAttr
 2270   lda #&FF
 2280   bne eorAttrN1
 2290 .forN
 2300 \ FOR command
 2310 \ This executes subsequent text
 a given number of times (1-256)
 2320   jsr getStrChar
Get the count
 2330   ldx sp
Push it on the stack
 2340   sta stack,X
 2350   lda strPtr+1
Then push the loop address
 2360   sta stack-1,X
 2370   lda strCsr
 2380   sta stack-2,X
 2390 .push3
\Adjust the sp for three bytes
 2400   dex
 2410 .push2
\Adjust the sp for two bytes
 2420   dex
 2430   dex
 2440   bpl noStackOverflow
And check for overflow
 2450 .stackOverflow
 2460   brk:EQUB 0:EQUS "Too many FOR
s/JSRs":brk
 2470 .next
 2480 \ NEXT command
 2490 \ Decrement the count for the m
os recent FOR and loop if
 2500 \ it hasn't reached zero
 2510   ldx sp
Get the stack pointer
```

→

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the SCYTHE

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Scroller listing

From Page 135

```
 2520   cpx #stackSize-3
and check there's a FOR loop active
 2530   bcs stackUnderflow
 2540   dec stack+3,X
Decrement the loop count
 2550   bne doNext
Not zero so branch back to the FOR
 2560   inx
Pop three bytes from the stack
 2570 .next1
 2580   inx
Pop two bytes from the stack
 2590   inx
 2600 .noStackOverflow
 2610   stx sp
 2620   rts
 2630 .doNext
 2640   lda stack+1,X
Get the FOR loop address
 2650   sta strCsr
and jmp to it
 2660   lda stack+2,X
 2670   sta strPtr+1
 2680   rts
 2690 .stackUnderflow
 2700   brk:EQUB 0:EQUS "Too many NEX
Ts":brk
 2710 .setPostChar
 2720 \ The POST command
 2730 \ Set the (relative) postChar a
ddress from the two bytes
 2740 \ following the opcode
 2750   jsr getAttrAndN
 2760   stx postChar
 2770   sta postChar+1
 2780   rts
 2790 .jsrAddr
 2800 \ The JSR command
 2810 \ Do a subroutine to the (realt
ive) address given in the two
 2820 \ byes following the opcode.
 2830   jsr getAttrAndN            Get
 the relative address in XY
 2840   tay
 2850 .jsrAddr1
 2860   stx tempCol                Sav
e the low byte
 2870   ldx sp                     Pus
h the address of the next byte
 2880   lda strPtr+1
 2890   sta stack,X
 2900   lda strCsr
 2910   sta stack-1,X
 2920   jsr push2                  Dec
rement sp by 2, checking for overflow
 2930   clc                        Add
 the displacement address to strBuffe
r
 2940   lda tempCol
 2950   adc #strBuffer MOD &100
 2960   sta strCsr                 and
 store this in strPtr/strCsr
 2970   tya
 2980   adc #strBuffer DIV &100
 2990   sta strPtr+1
 3000   jsr dispStrLoop            Cal
l the main loop recursively
 3010   ldx sp                     On
return (zero byte) pull the old
 3020   lda stack+1,X              str
Ptr/strCsr value
 3030   sta strCsr
 3040   lda stack+2,X
 3050   sta strPtr+1
 3060   jmp next1                  and
 adjust the stack pointer
 3070 .goto
 3080 \ The GOTO command
 3090 \ This sets strPtr/strCsr strBu
ffer+disp
 3100   jsr getAttrAndN
 3110   tay
 3120   txa
 3130   clc
 3140   adc #strBuffer MOD &100
 3150   sta strCsr
 3160   tya
 3170   adc #strBuffer DIV &100
 3180   sta strPtr+1
 3190   rts
 3200 .get
 3210 \ The GET command
 3220 \ This wait for a key to be pre
ssed and displays it
 3230   jsr osrdch
 3240   bcs dispCharEnd
 3250 .dispChar
 3260 \ This is the main display rout
ine. It scroll the character in A
 3270 \ on to the screen, given the v
arious attributes
 3280   sta parBlk                 Rea
d the character defn.
 3290   lda #10                    usi
ng OSWORD 10
 3300   ldx #parBlk MOD &100
 3310   ldy #parBlk DIV &100
 3320   jsr osword
 3330   lda #&80                   Set
 the column mask to binary 10000000
 3340   sta colMask
 3350 .dispCharLoop
 3360   lda characterWidth         Get
 the width count for each pixel
 3370   sta colCount               Use
 colCount as the looping variable
 3380 .dispCharLoop1
 3390   lda #waitVsync             Wai
t for the flyback to start
 3400   jsr osbyte
 3410   jsr dispColumn             Dis
play one column of the character
 3420   dec colCount               Do
this colCount times
 3430   bne dispCharLoop1
 3440   lsr colMask                Nex
t pixel in the character
 3450   bcc dispCharLoop           The
 mask bit goes after the last go
 3460 .dispCharEnd
 3470   rts                        Ret
urn
 3480 .parBlk  EQUB 0              Par
ameter block for OSWORD 10
 3490          EQUD 0
 3500          EQUD 0
 3510 .dispColumn
 3520   ldx #12                    Set
 the screen address in the 6845
 3530   stx vidAddr                Thi
s is r12 (MSB) and r13 (LSB)
 3540   ldy topOfScreen+1          top
OfScreen contains the actual value/8
 3550   sty vidData
 3560   inx
 3570   stx vidAddr
 3580   ldy topOfScreen
 3590   sty vidData
 3600   lda scrAddr                Sta
rt of the cell pointer on the last
 3610   sta cellPtr                cha
racter position of the top line
 3620   lda scrAddr+1
 3630   sta cellPtr+1
 3640   lda #0
 3650   sta charCellRow            Row
 number in the char cell (0..7)
 3660   sta currentRow             Row
 number on the screen (0..255)
 3670   sta overflow               Ove
rflow byte, -ve if we try >256 rows
 3680   sta charRow                Row
 number in the character definition
 3690   lda topBorderCol           Do
a column of the top border colour
 3700   ldx topBorderHeight
 3710   jsr fillColumn
 3720 .dispColumnLoop
 3730   ldy charRow                Do
the 8 character rows
```

Scroller listing

From Page 137

```
 3740   lda parBlk+1,Y              Get
 the defn. byte
 3750   and colMask                 Mas
k for the current column
 3760   bne bitSet                  Thi
s pixel is set
 3770   lda backgroundCol           No,
 it's clear so use background byte
 3780   jmp drawBit
 3790 .bitSet
 3800   lda foregroundCol
 3810 .drawBit
 3820   ldx characterHeight         Do
each char row characterHeight times
 3830   jsr fillColumn
 3840   inc charRow                 Nex
t row in the character defn.
 3850   ldy charRow
 3860   cpy #8                      Las
t one?
 3870   bcc dispColumnLoop          No
 3880   lda currentRow              Fin
ally do 256-currentRow rows of the
 3890   eor #&FF                    bot
tom border colour
 3900   tax
 3910   inx
 3920   lda bottomBorderCol
 3930   jsr fillColumn
 3940 .updateAddrs
 3950   clc                         Fin
ally update the scrAddr and topOfScre
en (6845)
 3960   lda scrAddr                 poi
nters. scrAddr=scrAddr+8 (one column)
 3970   adc #8
 3980   sta scrAddr
 3990   bcc noCarry1
 4000   inc scrAddr+1
 4010   bpl noCarry1                If
it goes above &8000, then wraparound
 4020   lda scrAddr+1               by
subtracting the screen size
 4030   sbc bytesPerScreen
 4040   sta scrAddr+1
 4050 .noCarry1
 4060   inc topOfScreen             top
OfScreen=topOfScreen+1
 4070   bne noCarry2
 4080   inc topOfScreen+1
 4090   lda topOfScreen+1
 4100   cmp #&80 DIV 8              Aga
in, check for wraparound
 4110   bcc noCarry2
 4120   sbc bpsDiv8
 4130   sta topOfScreen+1
```

```
 4140 .noCarry2
 4150   rts
 4160 .fillColumn
 4170   bit overflow                Thi
s check that we haven't finished alre
ady
 4180   bmi fillColumnEnd           Yes
 we have
 4190   sta tempCol                 Sav
e the colour fill byte
 4200   ldy charCellRow             Get
 the row in the current cell
 4210   inx                         Pre
-increment X to make the test easier
 4220 .fillColumnLoop
 4230   dex                         Las
t row?
 4240   beq fillColumnEnd           Yes
, return
 4250   inc currentRow              Inc
rement row counter
 4260   bne fillCol1
 4270   dec overflow
 4280 .fillCol1
 4290   sta (cellPtr),Y             Sto
re the colour byte on the screen
 4300   iny                         Nex
t row in the cell
 4310   cpy #8                      End
 of cell?
 4320   bne fillColumnLoop          No
 4330   ldy #0                      Yes
, reset Y
 4340   clc                         and
 add bytesPerRow to the screen pointe
r
 4350   lda cellPtr
 4360   adc bytesPerRow
 4370   sta cellPtr
 4380   lda cellPtr+1
 4390   adc bytesPerRow+1
 4400   bpl notBoundary             Che
ck for &8000 wraparound
 4410   sec
 4420   sbc bytesPerScreen
 4430 .notBoundary
 4440   sta cellPtr+1
 4450   lda tempCol                 Get
 the fill colour back
 4460   jmp fillColumnLoop
 4470 .fillColumnEnd
 4480   sty charCellRow             Sav
e row in cell for next time
 4490   rts
 4500 .comTab
 4510 .postChar
 4520 \ This is the table of command
routine addresses
```

```
 4530 \ the minus 1 is beacuse rts is
used to jmp to the routine
 4540        EQUW 0                 This
 first entry is the postChar address
 4550 .Set  EQUW setAttrN-1
 4560 .Rst  EQUW rstAttr-1
 4570 .Add  EQUW addAttrN-1
 4580 .Inc  EQUW incAttr-1
 4590 .Dec  EQUW decAttr-1
 4600 .Ror  EQUW rorAttrN-1
 4610 .Ror1 EQUW rorAttr1-1
 4620 .Rol1 EQUW rolAttr1-1
 4630 .Eor  EQUW eorAttrN-1
 4640 .Inv  EQUW invAttr-1
 4650 .For  EQUW forN-1
 4660 .Next EQUW next-1
 4670 .Post EQUW setPostChar-1
 4680 .Jsr  EQUW jsrAddr-1
 4690 .Goto EQUW goto-1
 4700 .Get  EQUW get-1
 4710 .lastCommand
 4720 .defaults
 4730 \ This is the table of default
values for the attributes
 4740    EQUB &00
 4750    EQUB &00
 4760    EQUB &FF
 4770    EQUB &00
 4780    EQUB &40
 4790    EQUB &08
 4800    EQUB &01
 4810 .stack
 4820    EQUS STRING$(stackSize," ")
 4830 ]
 4840 PROCconstants
 4850 [opt pass
 4860 .strBuffer
 4870 \ This is where the string to b
e executed goes
 4880 EQUS "Testing..."
 4890 EQUS FNret
 4900 EQUS FNfor(0):EQUS FNfor(230)
 4910 EQUS FNnext+FNnext
 4920 EQUS FNret
 4930 .postRout EQUS FNror1(FGC):EQUS
FNret
 4940 .rout EQUS"<>":EQUB 0
 4950 ]
 4960 NEXT
 4970 ENDPROC
 4980 DEF PROCconstants
 4990 REM Init some constants used in
the macros
 5000 REM First the command numbers
 5010 setC=FNc(Set)
 5020 rstC=FNc(Rst)
 5030 addC=FNc(Add)
 5040 incC=FNc(Inc)
```

```
5050 decC=FNc(Dec)
5060 rorC=FNc(Ror)
5070 ror1C=FNc(Ror1)
5080 rol1C=FNc(Rol1)
5090 eorC=FNc(Eor)
5100 invC=FNc(Inv)
5110 forC=FNc(For)
5120 nextC=FNc(Next)
5130 postC=FNc(Post)
5140 jsrC=FNc(Jsr)
5150 gotoC=FNc(Goto)
5160 getC=FNc(Get)
5170 REM The attribute numbers
5180 TBC=topBorderCol-attributes
5190 BGC=backgroundCol-attributes
5200 FGC=foregroundCol-attributes
5210 BBC=bottomBorderCol-attributes
5220 TBH=topBorderHeight-attributes
5230 CHH=characterHeight-attributes
5240 CHW=characterWidth-attributes
5250 ENDPROC
5260 DEF FNc(addr)=(addr-comTab) DIV
2
5270
5280 DEF FNset(attr,val) = FNtwo(set
C,attr,val)
 5290 DEF FNrst(attr)      = FNone(rst
C,attr)
 5300 DEF FNadd(attr,val) = FNtwo(add
C,attr,val)
 5310 DEF FNinc(attr)      = FNone(inc
C,attr)
 5320 DEF FNdec(attr)      = FNone(dec
C,attr)
 5330 DEF FNror(attr,val) = FNtwo(ror
C,attr,val)
 5340 DEF FNror1(attr)     = FNone(ror
1C,attr)
 5350 DEF FNrol1(attr)     = FNone(rol
1C,attr)
 5360 DEF FNeor(attr,val) = FNtwo(eor
C,attr,val)
 5370 DEF FNinv(attr)      = FNone(inv
C,attr)
 5380 DEF FNfor(n)         = FNone(for
C,n)
 5390 DEF FNnext           = FNzero(ne
xtC)
 5400 DEF FNpost(addr)     = FNrel(pos
tC,addr)
 5410 DEF FNjsr(addr)      = FNrel(jsr
C,addr)
 5420 DEF FNgoto(addr)     = FNrel(got
oC,addr)
 5430 DEF FNget            = FNzero(ge
tC)
 5440 DEF FNret            = FNzero(0)
 5450
 5460 DEF FNzero(op)
 5470        [opt pass:EQUB op:]:=""
 5480 DEF FNone(op,attr)
 5490        [opt pass:EQUB op:EQUB at
tr:]:=""
 5500 DEF FNtwo(op,attr,val)
 5510        [opt pass:EQUB op:EQUB at
tr:EQUB val:]:=""
 5520 DEF FNrel(op,addr)
 5530        [opt pass:EQUB op:EQUW ad
dr-strBuffer:]=""
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

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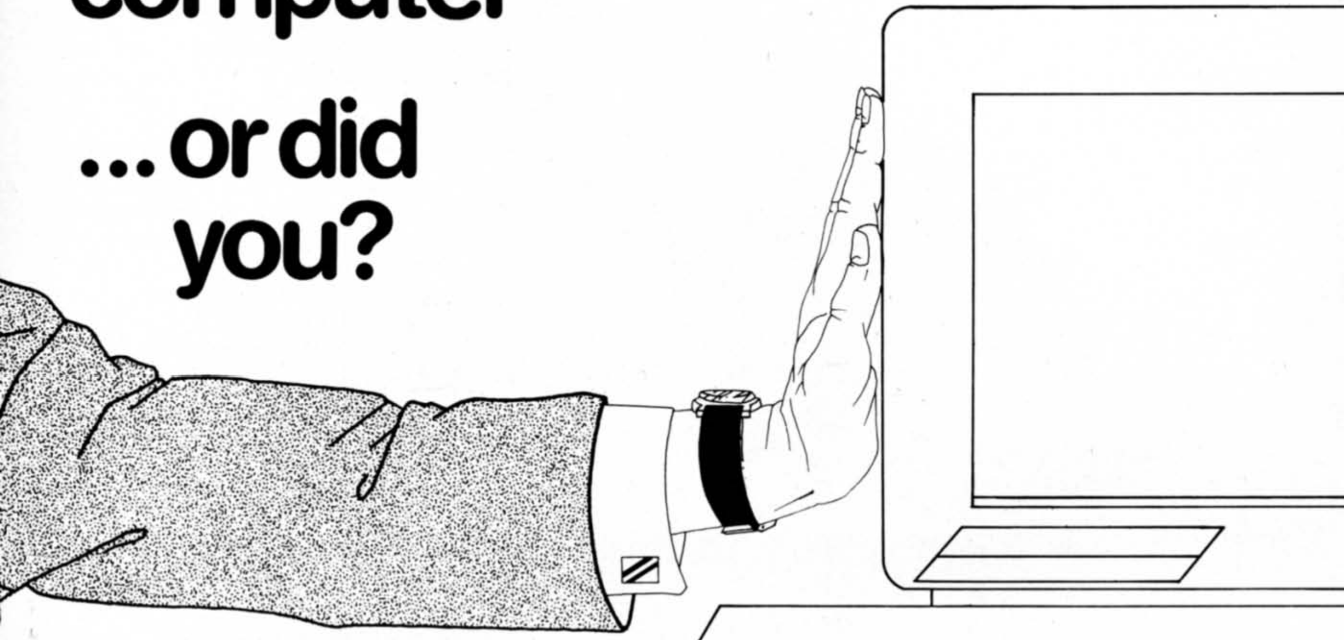

Well on Sept 13th you can find out. The first issue of **Computing Age** will be available on the newstand. On the front will be a FREE 32 page booklet assessing the seven best new generation micros... how does your computer stack up with the best?

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If you're serious about computing, get **Computing Age,** on sale Sept 13th.

COMPUTING
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Disc Scanner listing

From Page 103

```
 10 REM ***********************
 20 REM *    DISC SCANNER     *
 30 REM *   Bv Geoff Turner   *
 40 REM * (c) The MICRO USER *
 50 REM *        1985         *
 60 REM ***********************
 70 P%=&0B00
 80 REM ASSEMBLE MACHINE CODE
 90 [
100 OPT 0
110 .catalogue
120 LDA#0
130 STA&70
140 LDA#0
150 STA&71
160 LDA#&0C
170 STA&72
180 LDA#&0
190 STA&73
200 LDA#&0
210 STA&74
220 LDA#&3
230 STA&75
240 LDA#&53
250 STA&76
260 LDA#&0
270 STA&77
280 LDA#&0
290 STA&78
300 LDA#&21
310 STA&79
320 LDA#&7F
330 LDX#&70
340 LDY#&00
350 JSR &FFF1
360 RTS
370 .delete
380 LDX #&00
390 LDY #&40
400 JSR &FFF7
410 RTS
420 ]
430 REM RUN SCANNER PROGRAM
440 REM CLOSE ALL FILES
450 CLOSE#0
460 REM UNLOCK ALL FILES
470 *ACCESS *.*
480 MODE 7
490 CLOSE#0
500 Tex$=CHR$(141)+CHR$(131)+CHR$(1
57)+CHR$(129)
510 PRINT TAB(0,0);Tex$;
520 PRINT TAB(0,1);Tex$;
530 PRINT TAB(0,23);Tex$;
540 PRINT TAB(0,24);Tex$;
550 PRINT TAB(8,0);"THE G.T. DISC S
CANNER"
560 PRINT TAB(8,1);"THE G.T. DISC S
CANNER"
570 PRINT TAB(7,7);"CONTROLS :-"
580 PRINT TAB(10,9);"RETURN for nex
t file"
590 PRINT TAB(10,10);"SPACE  for mo
re data"
600 PRINT TAB(7,14);"Insert disc in
 DRIVE 0"
610 PRINT TAB(10,15);"and press RET
URN"
620 REPEAT:G=GET:UNTIL G=13
630 REM READ CATALOGUE
640 CALL catalogue
650 I%=&0C00
660 REM MAIN LOOP
670 REPEAT
680 I%=I%+8:REM JUMP TO NEXT FILENA
ME
690 PROCfilename
700 REPEAT:UNTIL NOT INKEY(-99)
710 VDU26
720 PRINT TAB(4,23);SPC(35);
730 PRINT TAB(4,24);SPC(35);
740 VDU7
750 PRINT TAB(4,23);"SCANNING FILEN
AME  - ";F$;
760 PRINT TAB(4,24);"SCANNING FILEN
AME  - ";F$;
770 VDU28,0,21,39,3
780 IF ASC(LEFT$(F$,1))=0 THEN 820
790 PROCget
800 PROCdelete
810 CLS
820 VDU 28,0,24,39,3
830 UNTIL ASC(LEFT$(F$,1))=0
840 REM END SCAN
850 VDU26
860 PRINT TAB(4,23);SPC(30);
870 PRINT TAB(4,24);SPC(30);
880 PRINT TAB(4,23);"ALL FILES SCAN
NED";
890 PRINT TAB(4,24);"ALL FILES SCAN
NED";
900 REM LOCK ALL FILES
910 *ACCESS *.* L
920 *DRIVE 0
930 END
940 REM READ FILENAME
950 DEFPROCfilename
960 F$=""
970 FOR bit%=I% TO I%+7
980 F$=F$+CHR$(?bit%)
990 NEXT
1000 F$=RIGHT$(F$,1)+"."+LEFT$(F$,7)
1010 ENDPROC
1020 REM GET FILE DATA
1030 DEFPROCget
1040 CLS
1050 X=OPENUP(F$)
1060 REPEAT
1070 REPEAT
1080 count%=1
1090 REPEAT
1100 N=BGET#X
1110 IF N>31 AND N<127 PRINT CHR$(N)
; ELSE IF N=13 PRINT
1120 IF POS=39 OR N=13 count%=count%
+1
1130 UNTIL count%=20 OR EOF#X=-1
1140 *FX21,0
1150 IF EOF#X=0 VDU7:REPEAT:G=GET:UN
TIL G=13 OR G=32
1160 UNTIL G=13 OR G=32 OR EOF#X=-1
1170 UNTIL G=13 OR EOF#X=-1
1180 IF EOF#X=-1 THEN PROCeof
1190 CLOSE#X
1200 ENDPROC
1210 REM END OF FILE
1220 DEFPROCeof
1230 VDU26
1240 VDU7
1250 PRINT TAB(4,23);SPC(30);
1260 PRINT TAB(4,24);SPC(30);
1270 PRINT TAB(4,23);F$;" - END OF F
ILE REACHED";
1280 PRINT TAB(4,24);F$;" - END OF F
ILE REACHED";
1290 VDU28,0,22,39,2
1300 REPEAT:G=GET:UNTIL G=13
1310 ENDPROC
1320 REM DELETE FILE
1330 DEFPROCdelete
1340 VDU26
1350 PRINTTAB(4,23);SPC(34);
1360 PRINTTAB(4,24);SPC(34);
1370 PRINTTAB(4,23);F$;" - DELETE  (
Y/N) ?";
1380 PRINTTAB(4,24);F$;" - DELETE  (
Y/N) ?";
1390 REPEAT:G$=GET$:UNTIL G$="Y" OR
G$="N"
1400 IF G$="N" THEN 1450
1410 REM ASSEMBLE O.S. COMMAND LINE
1420 D$="DELETE "+F$
1430 $&4000=D$
1440 CALL delete
1450 VDU28,0,21,39,3
1460 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

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Solitaire listing

From Page 105

```
  10 REM SOLITAIRE
  20 REM By B & M Bond
  30 REM (c) The Micro User
  40 DIM L 9
  50 *TV0,1
  60 *FX4,1
  70 *FX11,0
  80 MODE7:VDU23;8202;0;0;0;
  90 PROCinstruct
 100 PROCoptions
 110 MODE1:VDU23;8202;0;0;0;:COLOUR2
 120 PROClarge("Solitaire",16,1)
 130 PROCinit:PROClayout
 140 IFop%=50PROCremove
 150 REPEAT
 160 X1%=416:Y1%=543
 170 PROCcursor(2):PROCinkey
 180 IFK$="Q"THEN300
 190 IFPOINT(X1%+32,Y1%-32)<>2PROCfa
lse:PROCcursor(3):GOTO160
 200 SOUND1,-vol%,148,1:x1%=X1%:y1%=
Y1%
 210 PROCinkey
 220 IFK$="Q"THEN300
 230 IFPOINT(X1%+32,Y1%-32)<>0PROCfa
lse:PROCcursor(3):GOTO160
 240 SOUND1,-vol%,148,1:x2%=X1%:y2%=
Y1%
 250 PROCdelay(10):PROCcursor(3)
 260 PROCcheck:VDU4
 270 IFF%=1F%=0:PROCfalse:GOTO160
 280 PROCpeg_box
 290 PROCdelay(10)
 300 UNTIL peg%=1 OR K$="Q"
 310 COLOUR2
 320 IFK$="Q"THEN360
 330 IFop%=49ANDPOINT(448,511)=2THEN
370
 340 IFop%=50PROCcheck_holes
 350 IFP%=1THEN370
 360 SOUND1,-vol%,20,10:SOUND1,-vol%
,8,10:PROClarge("Hard Luck!  Another
Game (Y/N)",5,29):GOTO380
 370 FORpi%=5TO149STEP8:SOUND1,-vol%
,pi%,1:NEXT:PROClarge("Well Done!  An
other Game (Y/N)",5,29)
 380 K$=GET$
 390 IFK$="Y"ORK$="y"MODE7:VDU23;820
2;0;0;0;:GOTO100
 400 IFK$<>"N"AND K$<>"n"THEN380
 410 END
 420 DEFPROCinstruct
 430 FORY%=1TO2:PRINTTAB(7,Y%)CHR$14
1CHR$132CHR$157CHR$135" S O L I T A I
 R E   "CHR$156:NEXT
 440 PRINT'CHR$134" The object of th
is game,is to remove  "CHR$134" all t
he pegs but one from the board."
 450 PRINTCHR$134" This is achieved,
 by jumping one peg  "CHR$134" over a
nother into an empty space.The"
 460 PRINTCHR$134" method used to ju
mp, is to place the  "CHR$134" sight
over the desired peg and press"
 470 PRINTCHR$134" Space Bar, then m
ove to the position  "CHR$134" you wi
sh to jump to, followed by the"
 480 PRINTCHR$134" Space Bar again.
Horizontal,Vertical  "CHR$134" or Dia
gonal moves are all valid."
 490 PRINT'CHR$129" KEYS USED:-"CHR$
131"*"SPC(4)"Move Up"'SPC(13)CHR$131"
?"SPC(4)"Move Down"
 500 PRINTSPC(13)CHR$131"Z"SPC(4)"Mo
ve Left"'SPC(13)CHR$131"X"SPC(4)"Move
 Right"
 510 PRINTSPC(13)CHR$131"Q"SPC(4)"Qu
it Game"'SPC(13)CHR$131"V"SPC(4)"Adju
st Volume"
 520 PRINTSPC(9)CHR$131"SPACE"SPC(4)
"Store Position"'''SPC(6)CHR$134"Pres
s Space Bar To Continue";
 530 REPEATUNTILGET=32:CLS
 540 ENDPROC
 550 DEFPROCoptions
 560 FORY%=2TO3:PRINTTAB(4,Y%)CHR$14
1CHR$132CHR$157CHR$135" G A M E  O P
T I O N S   "CHR$156:NEXT
 570 PRINT''CHR$131"OPTION (1) "CHR$
134"The pegs are placed in all "CHR$1
34"the holes on the playing area,with
 the"
 580 PRINTCHR$134"execption of the c
entral hole. To win, "CHR$134"the las
t peg must reside in this hole."
 590 PRINT''CHR$131"OPTION (2) "CHR$
134"An easier variation of the "CHR$1
34"game, can be played by removing on
e of"
 600 PRINTCHR$134"the pegs, from any
 part of the playing "CHR$134"area. T
he object then, being to finish"
 610 PRINTCHR$134"the game with the
last peg residing in "CHR$134"one of
the nine central holes."
 620 PRINT'''SPC(6)CHR$131"Please Se
lect Option Number"
 630 REPEAT:op%=GET
 640 UNTIL op%>48 AND op%<51
 650 ENDPROC
 660 DEFPROCinit
 670 vol%=10:peg%=32:co%=3:F%=0:A%=0
:P%=0
 680 VDU23,224,0,3,15,31,63,63,127,1
27,23,225,0,192,240,248,252,252,254,2
54,23,226,127,127,63,63,31,15,3,0,23,
227,254,254,252,252,248,240,192,0
 690 VDU23,228,0,0,3,15,31,31,63,63,
23,229,0,0,192,240,248,248,252,252,23
,230,63,63,31,31,15,3,0,0,23,231,252,
252,248,248,240,192,0,0
 700 Peg$=CHR$224+CHR$225+CHR$10+CHR
$8+CHR$8+CHR$226+CHR$227
 710 Hole$=CHR$228+CHR$229+CHR$10+CH
R$8+CHR$8+CHR$230+CHR$231
 720 ENDPROC
 730 DEFPROClayout:VDU19,3,4;0;
 740 RESTORE1750:MOVE306,160
 750 FORN%=1TO8:READX%,Y%:MOVE448,51
2:PLOT85,X%,Y%:NEXT
 760 MOVE984,156:MOVE1188,156:PLOT85
,984,864:PLJT85,1188,864
 770 RESTORE1760:GCOL0,1
 780 FORN%=1TO30:READX%,Y%
 790 IFX%=-1READX%,Y%:MOVEX%,Y%
 800 DRAWX%,Y%:NEXT:COLOUR131
 810 FORX%=0TO18STEP3:FORY%=0TO6STEP
3
 820 PRINTTAB(X%+4,Y%+12)Peg$:NEXT:N
EXT
 830 FORX%=0TO6STEP3:FORY%=0TO18STEP
3
 840 PRINTTAB(X%+10,Y%+6)Peg$:NEXT:N
EXT
 850 VDU5:IFop%=49GCOL0,0:MOVE416,54
3:PRINTHole$
 860 FORX%=992TO1120STEP64:FORY%=863
TO223STEP-64
 870 GCOL0,2:MOVEX%,Y%:PRINTPeg$:GCO
L0,0:MOVEX%,Y%:PRINTHole$:NEXT:NEXT:V
DU4
 880 COLOUR1:COLOUR128:PRINTTAB(29,1
1)"P"TAB(29,12)"e"TAB(29,13)"g"TAB(29
,18)"B"TAB(29,19)"o"TAB(29,20)"x"
 890 ENDPROC
 900 DEFPROClarge(A$,X%,Y%):VDU31,X%
,Y%
 910 LOCALa%,b%,c%,d%,X%,Y%,A%
 920 FORa%=1TOLENA$:?L=ASC(MID$(A$,a
%,1))
 930 X%=L MOD256:Y%=L DIV256:A%=10:C
ALL&FFF1
 940 FORb%=0TO1:VDU23,b%+130
 950 FORc%=0TO3:FORd%=0TO1:VDUL?(c%+
b%*4+1)
 960 NEXT:NEXT:NEXT
 970 VDU130,10,8,131,11:NEXT:ENDPROC
```

→

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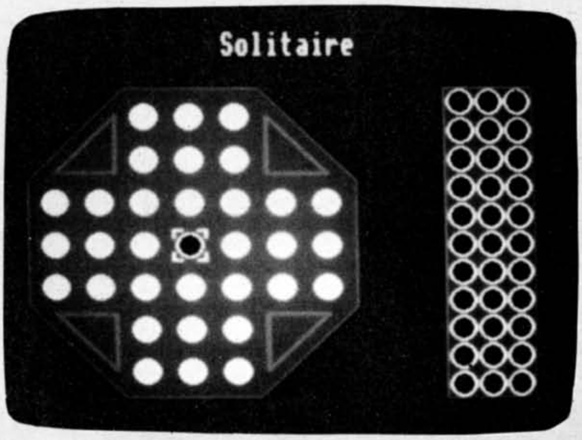
Solitaire listing

From Page 143

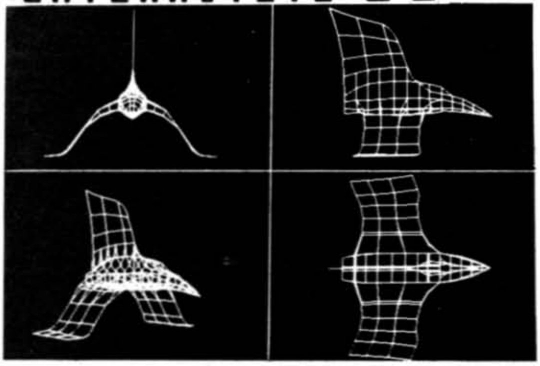


```
980 DEFPROCcursor(col%)
 990 GCOL0,col%:MOVEX1%,Y1%
 1000 MOVEX1%-4,Y1%-12:DRAWX1%-4,Y1%+
4:DRAWX1%+12,Y1%+4
 1010 MOVEX1%+51,Y1%+4:DRAWX1%+67,Y1%
+4:DRAWX1%+67,Y1%-12
 1020 MOVEX1%+67,Y1%-51:DRAWX1%+67,Y1
%-67:DRAWX1%+51,Y1%-67
 1030 MOVEX1%+12,Y1%-67:DRAWX1%-4,Y1%
-67:DRAWX1%-4,Y1%-51
1040 ENDPROC
 1050 DEFPROCinkey
 1060 REPEAT:K$=GET$
 1070 PROCcursor(3)
 1080 IFK$=":"ANDPOINT(X1%+32,Y1%+60)
<>3Y1%=Y1%+96
 1090 IFK$="/"ANDPOINT(X1%+32,Y1%-120
)<>3Y1%=Y1%-96
 1100 IFK$="Z"ANDPOINT(X1%-60,Y1%-32)
<>3X1%=X1%-96
 1110 IFK$="X"ANDPOINT(X1%+120,Y1%-32
)<>3X1%=X1%+96
 1120 IFK$=" "THEN1180
 1130 IFK$="V"ANDA%=0PROCvolume
 1140 IFK$="Q"ANDA%=0THEN1190
 1150 IFX1%<128X1%=128ELSEIFX1%>704X1
%=704
 1160 IFY1%<255Y1%=255ELSEIFY1%>831Y1
%=831
 1170 SOUND0,-vol%,200,1
 1180 PROCcursor(2)
 1190 UNTILK$=" "ORK$="Q"
 1200 ENDPROC
 1210 DEFPROCvolume
 1220 SOUND0,-vol%,200,1:COLOUR2
 1230 PRINTTAB(5,30)"VOLUME:"TAB(20,2
9)"S or L to alter"TAB(20,31)"Press V
 to exit";:COLOUR1:PRINTTAB(13,30);vo
l%
 1240 K$=GET$
 1250 IFK$="L"vol%=vol%+1
 1260 IFK$="S"vol%=vol%-1
 1270 IFK$="V"THEN1320
 1280 IFvol%<0vol%=0ELSEIFvol%>15vol%
=15
 1290 PRINTTAB(13,30);vol%;" "
 1300 SOUND0,-vol%,200,1
 1310 GOTO1240
 1320 FORY=29TO31:PRINTTAB(0,Y)SPC(39
);:NEXT
 1330 ENDPROC
 1340 DEFPROCfalse:COLOUR2:SOUND1,-vo
l%,70,4:PRINTTAB(5,29)"THAT'S NOT ALL
OWED"
 1350 PROCdelay(150):PRINTTAB(5,29)SP
C(18):ENDPROC
 1360 DEFPROCcheck
 1370 IFx2%=x1%+192ANDy2%=y1%ANDPOINT
(x1%+128,y1%-32)=2PROCjump:MOVEx1%+96
,y1%:PRINTHole$:ENDPROC
 1380 IFx2%=x1%-192ANDy2%=y1%ANDPOINT
(x1%-64,y1%-32)=2PROCjump:MOVEx1%-96,
y1%:PRINTHole$:ENDPROC
 1390 IFx2%=x1%ANDy2%=y1%+192ANDPOINT
(x1%+32,y1%+64)=2PROCjump:MOVEx1%,y1%
+96:PRINTHole$:ENDPROC
 1400 IFx2%=x1%ANDy2%=y1%-192ANDPOINT
(x1%+32,y1%-128)=2PROCjump:MOVEx1%,y1
%-96:PRINTHole$:ENDPROC
 1410 IFx2%=x1%+192ANDy2%=y1%+192ANDP
OINT(x1%+128,y1%+64)=2PROCjump:MOVEx1
%+96,y1%+96:PRINTHole$:ENDPROC
 1420 IFx2%=x1%-192ANDy2%=y1%+192ANDP
OINT(x1%-64,y1%+64)=2PROCjump:MOVEx1%
-96,y1%+96:PRINTHole$:ENDPROC
 1430 IFx2%=x1%+192ANDy2%=y1%-192ANDP
OINT(x1%+128,y1%-128)=2PROCjump:MOVEx
1%+96,y1%-96:PRINTHole$:ENDPROC
 1440 IFx2%=x1%-192ANDy2%=y1%-192ANDP
OINT(x1%-64,y1%-128)=2PROCjump:MOVEx1
%-96,y1%-96:PRINTHole$:ENDPROC
 1450 F%=1:ENDPROC
 1460 DEFPROCjump:VDU5
 1470 PROCdelay(20):SOUND1,-vol%,100,
1
 1480 GCOL0,0:MOVEx1%,y1%:PRINTHole$
 1490 PROCdelay(20):SOUND1,-vol%,100,
1
 1500 GCOL0,2:MOVEx2%,y2%:PRINTPeg$
 1510 PROCdelay(20):SOUND1,-vol%,100,
1
 1520 GCOL0,0:ENDPROC
 1530 DEFPROCdelay(time):TIME=0
 1540 REPEATUNTILTIME>time:ENDPROC
 1550 DEFPROCpeg_box:peg%=peg%-1
 1560 IFpeg%<32ANDpeg%>20ro%=31
 1570 IFpeg%<21ANDpeg%>9ro%=33
 1580 IFpeg%<10ANDpeg%>0ro%=35
 1590 co%=co%+2:IFco%>25co%=5
 1600 COLOUR131:COLOUR2
 1610 PRINTTAB(ro%,co%)Peg$;
 1620 COLOUR128:ENDPROC
 1630 DEFPROCremove:COLOUR2:A%=1
 1640 PRINTTAB(2,29)"Position the cur
sor over the peg you"TAB(3,31)"wish t
o remove and press Space Bar";
 1650 X1%=416:Y1%=543:PROCcursor(2)
 1660 REPEAT:PROCinkey:UNTILK$=" "
 1670 SOUND1,-vol%,100,1:PROCcursor(3
):VDU5:A%=0
 1680 GCOL0,0:MOVEX1%,Y1%:PRINTHole$
 1690 VDU4:FORY=29TO31:PRINTTAB(0,Y)S
PC(39);:NEXT:ENDPROC
 1700 DEFPROCcheck_holes
 1710 FORX%=352TO544STEP96
 1720 FORY%=608TO416STEP-96
 1730 IFPOINT(X%,Y%)=2P%=1
 1740 NEXT:NEXT:ENDPROC
 1750 DATA592,160,800,368,800,656,592
,866,306,866,96,656,96,368,306,160
 1760 DATA-1,-1,304,160,592,160,800,3
68,800,656,592,864,304,864,96,656,96,
368,304,160,-1,-1,984,156,1188,156,11
88,864,984,864,984,156
 1770 DATA-1,-1,160,672,288,672,288,8
00,160,672,-1,-1,608,672,736,672,608,
800,608,672,-1,-1,288,224,288,352,160
,352,288,224,-1,-1,608,224,736,352,60
8,352,608,224
```

This listing is included in this month's cassette tape offer. See order form on Page 173.

INTERACTIVE 3D

BBC B
OS 1.2



INTERACTIVE 3D is a unique program that actually allows you to create a design directly in a 3D view. And you can zoom, rotate, change viewpoint and perspective **during** the design process to visualise the effects of changes. A novel technique relates the 2D cursor to the position and movement of points on the full perspective view of the wire-frame model. The perspective view can be used on its own or in conjunction with plan, side and end orthographic views (these can also be shown individually).

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From Page 61

```
  320 DEFPROCdelay(del%):FORty%=1TOde
l%:NEXTty%:ENDPROC
  330 DEFPROCkick1:B%=1:E%=1:COLOUR3:
ON I%GOTO340,370,390
  340 PROCkickchars1:PRINTTAB(X%,20);
blank$:IFX%+2=N%THENGOTO370
  350 X%=X%+1
  360 PRINTTAB(X%,20);man$:I%=2:ENDPR
OC
  370 PROCkickchars2:PRINTTAB(X%,20);
man$:I%=3:IFX%+2=N%THENPROCcheck
  380 ENDPROC
  390 PROCkickchars1:PRINTTAB(X%,20);
man$:PROCstance:PRINTTAB(X%,20);man$:
I%=1:B%=0:E%=0:ENDPROC
  400 DEFPROCkick2:C%=1:R%=1:COLOUR1:
ON J%GOTO410,440,460
  410 PROCkickchars1:PROCcaller:PRINT
TAB(N%,20);blank$:IFN%-2=X%THENGOTO43
0
  420 N%=N%-1
  430 PRINTTAB(N%,20);man2$:J%=2:ENDP
ROC
  440 PROCkickchars2:PROCcaller:PRINT
TAB(N%,20);man2$:J%=3:IFN%-2=X%THENPR
OCcheck
  450 ENDPROC
  460 PROCkickchars1:PROCcaller:PRINT
TAB(N%,20);man2$:PROCstance:PROCcalle
r:PRINTTAB(N%,20);man2$:J%=1:C%=0:R%=
0:ENDPROC
  470 DEFPROChikick1:B%=2:E%=2:COLOUR
3:ON I%GOTO480,490,510
  480 PROChikchars1:PRINTTAB(X%,20);b
lank$:PRINTTAB(X%,19);man$:I%=2:ENDPR
OC
  490 PROChikchars2:PRINTTAB(X%,19);m
an$:I%=3:IFX%+2=N%THENPROCcheck
  500 ENDPROC
  510 PROChikchars1:PRINTTAB(X%,19);b
lank$:PRINTTAB(X%,20);man$:PROCstance
:PRINTTAB(X%,20);man$:B%=0:E%=0:I%=1:
ENDPROC
  520 DEFPROChikick2:C%=2:R%=2:COLOUR
1:ON J%GOTO530,540,560
  530 PROChikchars1:PROCcaller:PRINTT
AB(N%,20);blank$:PRINTTAB(N%,19);man2
$:J%=2:ENDPROC
  540 PROChikchars2:PROCcaller:PRINTT
AB(N%,19);man2$:J%=3:IFN%-2=X%THENPRO
Ccheck
  550 ENDPROC
  560 PROChikchars1:PROCcaller:PRINTT
AB(N%,19);blank$:PRINTTAB(N%,20);man2
$:PROCstance:PROCcaller:PRINTTAB(N%,2
0);man2$:C%=0:R%=0:J%=1:ENDPROC
  570 DEFPROCsweep1:B%=3:E%=3:COLOUR3
:ON I%GOTO580,590,610
  580 PROCsweepchars1:PRINTTAB(X%,20)
;man$:I%=2:ENDPROC
  590 PROCsweepchars2:PRINTTAB(X%,20)
;man$:I%=3:IFX%+2=N%THENPROCcheck
  600 ENDPROC
  610 PROCsweepchars1:PRINTTAB(X%,20)
;man$:PROCstance:PRINTTAB(X%,20);man$
:B%=0:I%=1:E%=0:ENDPROC
  620 DEFPROCsweep2:R%=3:C%=3:COLOUR1
:ON J%GOTO630,640,660
  630 PROCsweepchars1:PROCcaller:PRIN
TTAB(N%,20);man2$:J%=2:ENDPROC
  640 PROCsweepchars2:PROCcaller:PRIN
TTAB(N%,20);man2$:J%=3:IFN%-2=X%THENP
ROCcheck
  650 ENDPROC
  660 PROCsweepchars1:PROCcaller:PRIN
TTAB(N%,20);man2$:PROCstance:PROCcall
er:PRINTTAB(N%,20);man2$:J%=1:C%=0:R%
=0:ENDPROC
  670 DEFPROCsom1:E%=4:COLOUR3:ONI%GO
TO680,700,710,720
  680 IFX%-3<=2THENE%=0:ENDPROC
  690 PRINTTAB(X%,20);blank$:X%=X%-1:
PROCsomchars1:PRINTTAB(X%,19);man$:I%
=2:ENDPROC
  700 PRINTTAB(X%,19);blank$:X%=X%-1:
PROCsomchars2:PRINTTAB(X%,18);man$:I%
=3:ENDPROC
  710 PRINTTAB(X%,18);blank$:X%=X%-1:
PROCsomchars1:PRINTTAB(X%,19);man$:I%
=4:ENDPROC
  720 PRINTTAB(X%,19);blank$:PROCstan
ce:PRINTTAB(X%,20);man$:SOUND3,-12,1,
2:SOUND0,-15,6,2:I%=1:E%=0:ENDPROC
  730 DEFPROCsom2:R%=4:COLOUR1:ONJ%GO
TO740,760,770,780
  740 IFN%+3>=15THENR%=0:ENDPROC
  750 PRINTTAB(N%,20);blank$:N%=N%+1:
PROCsomchars1:PROCcaller:PRINTTAB(N%,
19);man2$:J%=2:ENDPROC
  760 PRINTTAB(N%,19);blank$:N%=N%+1:
PROCsomchars2:PROCcaller:PRINTTAB(N%,
18);man2$:J%=3:ENDPROC
  770 PRINTTAB(N%,18);blank$:N%=N%+1:
PROCsomchars1:PROCcaller:PRINTTAB(N%,
19);man2$:J%=4:ENDPROC
  780 PRINTTAB(N%,19);blank$:PROCstan
ce:PROCcaller:PRINTTAB(N%,20);man2$:S
OUND3,-12,1,2:SOUND0,-15,6,2:J%=1:R%=
0:ENDPROC
  790 DEFPROCinit
  800 ENVELOPE1,3,1,0,0,1,1,2,126,-3,
71,-10,126,34:ENVELOPE2,3,0,0,0,0,0,0
,121,-10,-5,-2,120,120
  810 X%=5:N%=12:B%=0:C%=0:I%=1:J%=1:
R%=0:E%=0:draw%=1
  820 VDU 23,250,&63,&63,&32,&34,&38,
&26,&23,&43,23,251,&61,&6F,&33,&32,&3
E,&22,&22,&41,23,252,&71,&7E,&32,&32,
&3C,&24,&22,&43,23,253,&00,&7C,&7F,&0
8,&08,&0C,&0C,&0C,23,254,&7F,&60,&30,
&3C,&30,&20,&3C,&43
  830 VDU 23,248,&FF,&80,&80,&80,&80,
&80,&80,&80
  840 blank$=CHR$(32)+CHR$(32)+CHR$(3
2)+CHR$(10)+CHR$(8)+CHR$(8)+CHR$(8)+C
HR$(32)+CHR$(32)+CHR$(32)+CHR$(8)+CHR
$(8)+CHR$(8)+CHR$(10)+CHR$(32)+CHR$(3
2)+CHR$(32)+CHR$(10)+CHR$(8)+CHR$(8)+
CHR$(8)+CHR$(32)+CHR$(32)+CHR$(32)
  850 man$=CHR$(224)+CHR$(225)+CHR$(2
26)+CHR$(10)+CHR$(8)+CHR$(8)+CHR$(8)+
CHR$(227)+CHR$(228)+CHR$(229)+CHR$(10
)+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(230)+C
HR$(231)+CHR$(232)+CHR$(10)+CHR$(8)+C
HR$(8)+CHR$(8)+CHR$(233)+CHR$(234)+CH
R$(235)
  860 man2$=CHR$(238)+CHR$(237)+CHR$(
236)+CHR$(10)+CHR$(8)+CHR$(8)+CHR$(8)
+CHR$(241)+CHR$(240)+CHR$(239)+CHR$(1
0)+CHR$(8)+CHR$(8)+CHR$(8)+CHR$(244)+
CHR$(243)+CHR$(242)+CHR$(10)+CHR$(8)+
CHR$(8)+CHR$(8)+CHR$(247)+CHR$(246)+C
HR$(245)
  870 ENDPROC
  880 DEFPROCstance
  890 REM *** STANCE ***
  900 VDU 23,224,&00,&00,&00,&00,&07,
&07,&07,&03,23,225,&00,&00,&00,&00,&0
0,&80,&80,&80,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&00,&3C,&63,&6
0,&C0,&E0,&70,&1C,23,228,&00,&60,&90,
&18,&18,&18,&2C,&2C
  910 VDU 23,229,&00,&00,&00,&00,&00,
&00,&00,&00,23,230,&0C,&00,&08,&0F,&0
F,&0F,&1E,&1C,23,231,&26,&46,&41,&C3,
&E0,&F0,&F0,&78,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00,23,233,&3C,&3C,&38,
&38,&38,&38,&20,&F0
  920 VDU 23,234,&38,&3C,&1C,&1C,&1C,
&1C,&08,&0E,23,235,&00,&00,&00,&00,&0
0,&00,&00,&00
  930 ENDPROC
  940 DEFPROCkickchars1
  950 REM *** KICK 1 ***
  960 VDU 23,224,&00,&00,&00,&00,&00,
&1C,&1E,&1E,23,225,&00,&00,&00,&00,&0
0,&00,&00,&00,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&0E,&00,&19,&6
0,&60,&C0,&E0,&74,23,228,&00,&40,&A0,
&38,&3C,&4C,&46,&46
  970 VDU 23,229,&00,&00,&00,&00,&00,
```

→

Karate listing

From Page 147

```
&00,&00,&00,23,230,&1C,&00,&11,&1C,&1
E,&1E,&1E,&1C,23,231,&42,&41,&03,&E0,
&F0,&F8,&7C,&3C,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00,23,233,&3C,&3C,&38,
&38,&38,&38,&20,&F0
  980 VDU 23,234,&1B,&02,&00,&00,&00,
&00,&00,&00,23,235,&00,&00,&00,&00,&0
0,&00,&00,&00
  990 ENDPROC
 1000 DEFPROCkickchars2
 1010 REM *** KICK 2 ***
 1020 VDU 23,224,&00,&00,&00,&00,&00,
&00,&1C,&1E,23,225,&00,&00,&00,&00,&0
0,&00,&00,&00,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&1E,&0E,&01,&1
8,&60,&60,&C0,&E0,23,228,&00,&00,&A0,
&38,&3E,&47,&40,&40
 1030 VDU 23,229,&00,&00,&00,&00,&00,
&40,&C0,&00,23,230,&74,&1C,&01,&1F,&1
F,&1E,&3C,&3C,23,231,&40,&7F,&FF,&FF,
&E0,&00,&00,&00,23,232,&6C,&FC,&E8,&C
0,&00,&00,&00,&00,23,233,&3C,&38,&38,
&38,&38,&38,&20,&F0
 1040 VDU 23,234,&00,&00,&00,&00,&00,
&00,&00,&00,23,235,&00,&00,&00,&00,&0
0,&00,&00,&00
 1050 ENDPROC
 1060 DEFPROChikchars1
 1070 REM *** HIKICK 1 ***
 1080 VDU 23,224,&00,&0E,&0F,&0F,&0F,
&27,&30,&70,23,225,&00,&00,&00,&00,&0
0,&20,&30,&38,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&60,&C0,&C0,&6
0,&28,&18,&0E,&0E,23,228,&58,&4C,&46,
&81,&81,&80,&40,&E0
 1090 VDU 23,229,&00,&00,&00,&80,&80,
&00,&00,&00,23,230,&1E,&1C,&1C,&0E,&0
F,&07,&06,&01,23,231,&F0,&78,&3C,&18,
&06,&04,&00,&00,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00,23,233,&03,&06,&00,
&00,&00,&00,&00,&00
 1100 VDU 23,234,&00,&00,&00,&00,&00,
&00,&00,&00,23,235,&00,&00,&00,&00,&0
0,&00,&00,&00
 1110 ENDPROC
 1120 DEFPROChikchars2
 1130 REM *** HIKICK 2 ***
 1140 VDU 23,224,&00,&1C,&1E,&1E,&1E,
&4E,&C0,&C0,23,225,&00,&00,&00,&00,&8
0,&C0,&E0,&60,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&C0,&D0,&90,&9
0,&90,&C8,&CF,&3F,23,228,&B0,&98,&86,
&46,&40,&C1,&FF,&FF
 1150 VDU 23,229,&00,&00,&00,&00,&06,
&F6,&F4,&E0,23,230,&7F,&7E,&1F,&0F,&0
3,&00,&00,&00,23,231,&FC,&00,&E0,&E8,
&E8,&18,&00,&00,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00,23,233,&00,&00,&00,
&00,&00,&00,&00,&00
 1160 VDU 23,234,&00,&00,&00,&00,&00,
&00,&00,&00,23,235,&00,&00,&00,&00,&0
0,&00,&00,&00
 1170 ENDPROC
 1180 DEFPROCsweepchars1
 1190 REM *** SWEEP 1 ***
 1200 VDU 23,224,&00,&00,&00,&00,&00,
&00,&00,&00,23,225,&00,&00,&00,&00,&0
0,&00,&00,&00,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&00,&00,&00,&0
0,&07,&07,&07,&03,23,228,&00,&00,&00,
&00,&00,&80,&80,&80
 1210 VDU 23,229,&00,&00,&00,&00,&00,
&00,&00,&00,23,230,&38,&60,&60,&D0,&D
```

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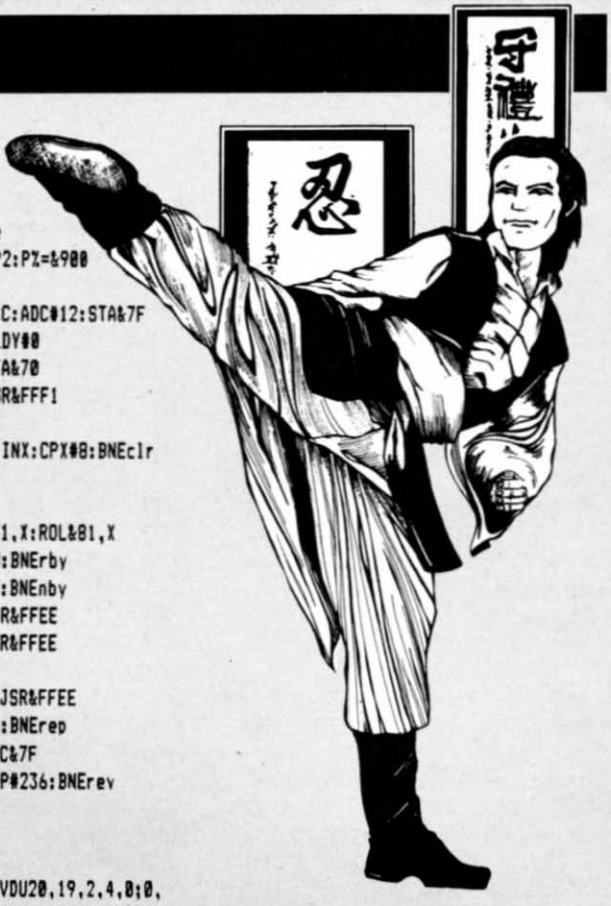

```
0,&C8,&8F,&9F,23,231,&20,&30,&30,&58,
&58,&98,&88,&C8,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00,23,233,&FD,&F8,&38,
&1C,&1C,&1C,&08,&38
 1220 VDU 23,234,&CC,&EC,&F0,&78,&3C,
&1E,&0E,&01,23,235,&00,&00,&00,&00,&0
0,&00,&C0,&C0
 1230 ENDPROC
 1240 DEFPROCsweepchars2
 1250 REM *** SWEEP 2 ***
 1260 VDU 23,224,&00,&00,&00,&00,&00,
&00,&00,&00,23,225,&00,&00,&00,&00,&0
0,&00,&00,&00,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&00,&00,&00,&0
0,&00,&00,&00,&07,23,228,&00,&00,&00,
&00,&00,&00,&00,&00
 1270 VDU 23,229,&00,&00,&00,&00,&00,
&00,&00,&00,23,230,&07,&07,&3B,&60,&6
0,&D0,&D0,&CC,23,231,&80,&80,&A0,&30,
&30,&58,&58,&98,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00,23,233,&9E,&9E,&CE,
&CE,&06,&00,&06,&0E
 1280 VDU 23,234,&68,&F8,&7C,&3C,&1F,
&0F,&03,&00,23,235,&00,&00,&00,&00,&0
0,&E0,&DC,&3C
 1290 ENDPROC
 1300 DEFPROCsomchars1
 1310 VDU 23,224,&00,&1C,&3E,&3E,&1E,
&0D,&02,&1C,23,225,&00,&00,&00,&00,&8
0,&C0,&63,&3F,23,226,&00,&00,&00,&00,
&00,&00,&00,&00,23,227,&38,&18,&1C,&0
F,&07,&00,&00,&00,23,228,&18,&00,&60,
&E7,&00,&BF,&7F,&7F
 1320 VDU 23,229,&00,&00,&00,&C0,&20,
&90,&D0,&D0,23,230,&00,&00,&00,&00,&0
0,&00,&00,&00,23,231,&3F,&01,&03,&01,
&03,&03,&01,&00,23,232,&D0,&D0,&C0,&A
0,&40,&A0,&D0,&D0,23,233,&00,&00,&00,
&00,&00,&00,&00,&00
 1330 VDU 23,234,&00,&00,&00,&00,&00,
&00,&00,&00,23,235,&00,&00,&00,&00,&0
0,&00,&00,&00
 1340 ENDPROC
 1350 DEFPROCsomchars2
 1360 VDU 23,224,&00,&00,&00,&00,&00,
&01,&01,&03,23,225,&00,&00,&01,&03,&E
7,&DA,&9D,&AE,23,226,&C0,&C0,&60,&70,
&30,&D8,&D8,&E0,23,227,&03,&06,&06,&0
2,&0C,&1E,&3E,&3E,23,228,&56,&36,&37,
&16,&0E,&1E,&7D,&79
 1370 VDU 23,229,&C0,&80,&00,&80,&C0,
&C0,&80,&00,23,230,&3E,&18,&00,&00,&0
0,&00,&00,&00,23,231,&06,&F8,&00,&00,
&00,&00,&00,&00,23,232,&00,&00,&00,&0
0,&00,&00,&00,&00
 1380 VDU 23,233,&00,&00,&00,&00,&00,
&00,&00,&00,23,234,&00,&00,&00,&00,&0
0,&00,&00,&00,23,235,&00,&00,&00,&00,
&00,&00,&00,&00
 1390 ENDPROC
 1400 DEFPROCreverse
 1410 FORZ%=0TO2STEP2:P%=&900
 1420 [OPT Z%
 1430       STA&7E:CLC:ADC#12:STA&7F
 1440 .rev LDX#&70:LDY#0
 1450       LDA&7E:STA&70
 1460       LDA#&A:JSR&FFF1
 1470       LDA#0:TAX
 1480 .clr STA&81,X:INX:CPX#8:BNEclr
 1490       LDX#0
 1500 .nby LDY#0
 1510 .rby CLC:ROR&71,X:ROL&81,X
 1520       INY:CPY#8:BNErby
 1530       INX:CPX#8:BNEnby
 1540       LDA#23:JSR&FFEE
 1550       LDA&7F:JSR&FFEE
 1560       LDX#0
 1570 .rep LDA&81,X:JSR&FFEE
 1580       INX:CPX#8:BNErep
 1590       INC&7E:INC&7F
 1600       LDA&7E:CMP#236:BNErev
 1610       RTS
 1620 ]NEXT
 1630 ENDPROC
 1640 DEFPROCscreen:VDU20,19,2,4,0;0,
17,0,17,131:FORk%=8TO15:FORmk%=2TO17:
PRINTTAB(mk%,k%);CHR$(248):NEXTmk%:NE
XTk%
 1650 FORf%=8TO16:COLOUR128:PRINTTAB(
6,f%);" ";TAB(13,f%);" ":NEXTf%:VDU17
,130,28,1,30,18,17,12,26,17,128,28,0,
31,1,0,12,26,28,18,31,19,0,12,26
 1660 VDU28,0,8,19,4,12,26,28,0,31,19
,29,12,26,17,129,28,0,31,0,0,12,26,28
,19,31,19,0,12,26,28,0,6,19,0,12,26,2
8,0,31,19,31,12,26
 1670 VDU5:GCOL0,0:t%=450:1%=1000:FOR
ui%=1TO4:MOVEt%,1%:PRINTCHR$(250)+CHR
$(251)+CHR$(252)+CHR$(251)+CHR$(253)+
CHR$(254):t%=t%+3:1%=1%-3:IFui%=3THEN
GCOL0,3
 1680 NEXT:VDU4,23,1,0;0;0;0;:ENDPROC
 1690 DEFPROCcheck
 1700 RESTORE1550
 1710 FORig%=1TO4
 1720 READM%,O%
 1730 IFM%=B%ANDO%=C%THENPROCman2dead
 1740 NEXTig%
 1750 FORgi%=1TO4
 1760 READM%,O%
 1770 IFM%=B%ANDO%=C%THENPROCman1dead
 1780 NEXTgi%
 1790 hj%=1:REPEAT
 1800 READM%,O%
 1810 IFM%=B%ANDO%=C%THENdraw%=draw%+
1:ENDPROC
 1820 IFdraw%=8THENGOSUB1880
 1830 hj%=hj%+1:UNTILhj%=8
 1840 DATA3,1,3,0,1,0,2,0
 1850 DATA1,3,0,3,0,1,0,2
 1860 DATA3,2,1,3,2,3,3,1,1,1,2,2,3,3
,0,0
 1870 ENDPROC
 1880 a%=RND(2):IFa%=1THENPROCman1dea
d
 1890 IFa%=2THENPROCman2dead
 1900 RETURN
 1910 DEFPROCdeadchars1
 1920 VDU 23,224,&00,&00,&00,&00,&18,
&3C,&3E,&1E,23,225,&00,&00,&00,&00,&0
0,&00,&06,&C6,23,227,&0C,&20,&20,&60,
&70,&68,&64,&34,23,228,&22,&36,&3C,&5
C,&48,&20,&20,&20,23,230,&34,&13,&13,
&1B,&1B,&03,&01,&01
 1930 VDU 23,231,&C0,&E0,&A0,&B0,&90,
&D0,&D0,&D8,23,233,&01,&01,&00,&00,&0
0,&00,&00,&00,23,234,&C8,&E8,&E8,&E8,
&E0,&DB,&36,&6C
 1940 FORgr%=226TO235STEP3:VDU23,gr%,
0,0,0,0,0,0,0,0:NEXTgr%
 1950 ENDPROC
 1960 DEFPROCdeadchars2
 1970 VDU23,230,&00,&00,&60,&F0,&F0,&
67,&00,&60,23,231,&00,&00,&00,&00,&00
,&80,&E0,&30,23,232,&00,&00,&00,&00,&
```

→

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```
00,&00,&00,&00,23,233,&70,&3C,&0E,&03,&03,&00,&00,&00,23,234,&08,&3C,&73,&7C,&7F,&1F,&07,&01
 1980 VDU 23,235,&00,&00,&14,&B6,&36,&B6,&B6,&B6
 1990 FORhy%=224TO229:VDU23,hy%,0,0,0,0,0,0,0,0:NEXThy%
 2000 ENDPROC
 2010 DEFPROCman1dead:COLOUR3:SOUND0,-15,45,2
 2020 PROCdeadchars1:PRINTTAB(X%,20);man$:PROCdelay(300):PROCdeadchars2:PRINTTAB(X%-1,20);man$:COLOUR1:PROCstance:PROCcaller:PRINTTAB(N%,19);blank$;TAB(N%,20);man2$
 2030 PROCtwiddle:PROCdelay(200):PROCnextbelt(1)
 2040 PROCstart:GOTO110
 2050 DEFPROCman2dead:COLOUR1:SOUND0,-15,45,2
 2060 PROCdeadchars1:PROCcaller:PRINTTAB(N%,20);man2$:PROCdelay(300):PROCdeadchars2:PROCcaller:PRINTTAB(N%+1,20);man2$:COLOUR3:PROCstance:PRINTTAB(X%,19);blank$;TAB(X%,20);man$
 2070 PROCtwiddle:PROCdelay(200):PROCnextbelt(2)
 2080 PROCstart:GOTO110
 2090 DEFPROCnextbelt(kl%):COLOUR129:VDU28,0,5,19,4,12,26
 2100 IFkl%=1THENbelt2%=belt2%+1
 2110 IFkl%=2THENbelt1%=belt1%+1
 2120 RESTORE2180
 2130 FORbt%=1TObelt1%:READcol1$:NEXTbt%
 2140 RESTORE2180
 2150 FORtb%=1TObelt2%:READcol2$:NEXTtb%
 2160 IFbelt1%=6THENPROCwin(1)
 2170 IFbelt2%=6THENPROCwin(2)
 2180 DATAWhite,Yellow,Green,Purple,Brown,Black
 2190 ENDPROC
 2200 DEFPROCstart:X%=5:N%=12:draw%=0
 2210 COLOUR3:COLOUR129:PRINTTAB(2,5);col1$;TAB(13,5);col2$:COLOUR130:VDU28,3,28,16,17:CLS:VDU26:PROCbow:COLOUR3:PRINTTAB(X%,20);man$:COLOUR1:PROCcaller:PRINTTAB(N%,20);man2$:PROCdelay(1600)
 2220 PROCstance:COLOUR3:PRINTTAB(X%,20);man$:COLOUR1:PROCcaller:PRINTTAB(N%,20);man2$:ENDPROC
 2230 DEFPROCwin(pl%):*FX9,3
 2240 VDU23,1,0;0;0;0;:*FX10,3
 2250 *FX15,0
 2260 VDU26,17,129,12,28,1,29,18,2,17,128,12,26,28,2,27,17,4,17,130,12,26
 2270 COLOUR3:PRINTTAB(7,5);CHR$(250)+CHR$(251)+CHR$(252)+CHR$(251)+CHR$(253)+CHR$(254)
 2280 COLOUR0:PRINTTAB(2,7);"CONGRATULATIONS!":COLOUR3:PRINTTAB(2,9);"You have reached";TAB(4,11);"the status of":COLOUR0:PRINTTAB(5,13);"BLACK BELT"
 2290 PRINTTAB(4,26);"PRESS  SPACE":PROCstance:COLOUR3:IFpl%=2THENCOLOUR1
 2300 PROChikchars1
 2310 IFpl%=1THENPRINTTAB(9,18);man$
 2320 IFpl%=2THENPROCcaller:PRINTTAB(9,18);man2$
 2330 *FX15,0
 2340 SOUND1,-14,40,8:SOUND2,-13,41,8:PROCdelay(860):SOUND1,-14,50,2:SOUND2,-13,51,2:PROCdelay(700):SOUND1,-14,50,2:SOUND2,-13,51,2:PROCdelay(700):SOUND1,-15,74,9:SOUND2,-15,75,9:SOUND3,-10,85,9
 2350 A$=GET$:COLOUR128:CLS:PROCinst
 2360 DEFPROCbow
 2370 VDU 23,224,&00,&00,&00,&00,&00,&00,&00,&00,23,225,&01,&03,&03,&03,&0D,&10,&16,&27,23,226,&C0,&E0,&E0,&E0,&C0,&00,&40,&40,23,227,&00,&00,&00,&00,&00,&00,&00,&00,23,228,&27,&2E,&2E,&2D,&2D,&4A,&4A,&5A
 2380 VDU 23,229,&40,&80,&80,&00,&00,&00,&00,&00,23,230,&00,&00,&00,&00,&00,&00,&00,&00,23,231,&5A,&42,&7E,&7A,&3A,&3A,&3A,&3A,23,232,&00,&00,&00,&00,&00,&00,&00,&00,23,233,&00,&00,&00,&00,&00,&00,&00,&00
 2390 VDU 23,234,&3A,&3A,&3A,&3A,&3A,&00,&3D,&3E,23,235,&00,&00,&00,&00,&00,&00,&80,&C0
 2400 ENDPROC
 2410 DEF PROCinst:*FX21,0
 2420 VDU26,17,129,12,28,1,29,18,2,17,128,12,26,28,2,27,17,4,17,130,12,26
 2430 VDU17,3:PRINTTAB(7,5);CHR$(250)+CHR$(251)+CHR$(252)+CHR$(251)+CHR$(253)+CHR$(254)
 2440 VDU17,3:PRINTTAB(3,7);"Your reactions";TAB(5,9);"and  quick";TAB(3,11);"thinking  must";TAB(2,13);"be at their best"
 2450 COLOUR0:PRINTTAB(2,16);"You have 4 moves":PROCsweepchars2:PRINTTAB(6,17);man$:PROChikchars2:PRINTTAB(11,18);man$:PROCkickchars2:PRINTTAB(6,23);man$:PROCsomchars2:PRINTTAB(11,23);man$
 2460 VDU17,129,17,3:PRINTTAB(4,30);"PRESS  SPACE":PROCtune:VDU26,17,130,28,2,27,17,6,12,26
 2470 VDU17,0:PRINTTAB(3,7);"KEYS":PROCstance:VDU17,3:PRINTTAB(5,9);man$:PRINTTAB(9,9);"- CTRL";TAB(9,10);"- A";TAB(9,11);"- S";TAB(9,12);"- X"
 2480 VDU17,1:PROCstance:PROCcaller:PRINTTAB(5,16);"RETURN";TAB(5,17);"]";TAB(5,18);":";TAB(5,19);"/";TAB(12,16);man2$
 2490 VDU17,0:PRINTTAB(2,22);"W/Q  SOUND/QUIET";TAB(2,24);"F/R  FREEZE/REST"
 2500 PROCtune:@%=1234567:RUN
 2510 ENDPROC
 2520 DEFPROCfreeze
 2530 B$=INKEY$(0):IFB$="R"THENENDPROC
 2540 GOTO2530
 2550 ENDPROC
 2560 DEFPROCtune:VDU23,1,0;0;0;0;
 2570 RESTORE2650:REPEAT
 2580 L$=INKEY$(0):IFL$=" "THENENDPROC
 2590 IFL$="Q"THEN*FX210,1
 2600 IFL$="W"THEN*FX210,0
 2610 READP%,L%,W%:SOUND2,1,P%-20,L%:SOUND1,1,P%,L%
 2620 FORF%=1TOW%:NEXT
 2630 UNTILW%=1600
 2640 GOTO2570
 2650 DATA140,3,2100,140,3,2100,145,2,1200,156,2,1300,148,2,1200,139,2,1300,134,8,4500,144,3,2100,144,3,2100,160,7,3100,145,2,1300,135,6,4500,155,3,2100,155,3,2100
 2660 DATA160,2,1200,171,2,1300,163,2,1200,154,2,1300,149,8,4500,159,3,2100,159,3,2100,175,7,3100,160,2,1300,150,1,1000,152,1,400,150,1,400,147,2,1100,147,2,1300,134,2,1100,134,2,1200,127,2,1100,127,2,1600
 2670 ENDPROC
 2680 DEFPROCtwiddle
 2690 RESTORE2750:REPEAT
 2700 READno%,le%,wa%
 2710 SOUND2,1,no%-23,le%:SOUND1,1,no%-3,le%
 2720 FORD%=1TOwa%+200:NEXT
 2730 UNTILwa%=2000
 2740 ENDPROC
 2750 DATA150,1,1000,152,1,400,150,1,400,147,2,1100,147,2,1300,134,2,1100,134,2,1200,127,5,2000
```

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MICROMAIL

Set standard to avoid ROM conflicts

HAVING had a number of problems in the past with conflict between ROMs and various programs, I would like to suggest the adoption of the following standard which would remove the potential for conflict.

*Conflicts could be avoided if all manufactures of ROM-based utilities programmed the utility so that on power up the ROM was normally in a deactivated state, the utility ROM then being activated by an *FX command, for example *FX 162,x where x is the logical ROM number, and deactivated by *FX 162, (x + 128).*

This would remove the possibility of conflict between ROMs and programs, and would work wherever the ROMs were placed logically. – **Victor Markwart, Wanniassa, Australia.**

● Thanks for your comments. As many of us are aware, several ROMs have commands which clash. Adopting a method similar to the one you've suggested would hopefully eliminate the problem.

However, some ROMs which claim RAM on power up could introduce problems.

Over the past few months several software houses have included the option to prefix * commands with another character – Z for example. This would provide a much neater method of using ROM commands because enabling and disabling ROMs is rather drastic.

Mother trouble . . .

THANK heavens that Bob has begun writing to Trev again.

I know how he feels. I have woman trouble, too, but mine is worse.

It's not girlfriend trouble but mother trouble.

I often leave the computer running an adventure while I go and do something else – only to find it turned off when I get back.

When I explain that my micro uses only one-third of the electricity of her light bulb, I get told not to be cheeky. – **Commander Panther (Elite), Heanor, Derbyshire.**

P.S. I have finished The Hobbit many times – about twenty – but I have never got 100 per cent. My highest finishing score is 97 per cent, and lowest is 62 per cent.

● Yes, it's nice to have the pleasure of reading Bob's intimate mail again.

Has anyone achieved a higher percentage in The Hobbit?

RAM Card updated

HAVING just read the review of our 32k RAM Card in the August issue of your esteemed publication, perhaps I might clarify a few areas of confusion that appear to have arisen.

The RAM Card that was reviewed was an early model. An updated version was introduced towards the end of last year, followed by some extended software earlier this year. The current board does not now require any soldering to fit.

At the same time as the new software was introduced, we rewrote the manual. This documents all the new commands as well as correcting the confusion with the CLAIMON and CLAIMOFF commands.

The section on fitting the ROM in the manual is correct; the RAM Card ROM should be fitted as the lowest priority socket.

Unfortunately, your reviewer appears to have become a little confused here, for he suggests that the manual is inaccurate and that the ROM should be in the highest priority – this is not correct.

*The reviewer requested a means of extracting the status information but with a shorter commands sequence. Can we suggest *H.RAM. – this is an abbreviated version of the command that the reviewer entered.*

In order to make Wordwise operate with a RAM card, you will require a version of Wordwise with an issue number of 1.20 or later.

*The question of *W. going to the RAM Card memory editor, as opposed to Wordwise, is simply a question of ROM priorities. If you were to put Wordwise into a higher priority socket then *W. would enter Wordwise.*

**XW. is the suggested way of entering Wordwise as it also performs all the most common RAM Card setups in one command for the user.*

The RAM Card is, again despite the misconception given by the reviewer, Second Processor compatible.

*The latest news on the RAM Card is that a new command, *RAMTEST, has been incorporated to allow the user to satisfy himself that the board is working correctly.* – **David Fell, Watford Electronics.**

● Thanks for the helpful comments – we like to be as up-to-date as possible. To be fair to our reviewer, nobody told us of the new version!

Helping hand

I AM writing to inform you about a club that I am setting up called the R.S.P.F.K.6. This stands for the Royal Society for the Protection of Function Key 6.

I have heard of a pared-down BBC being offered on the market at below market prices, but I never thought that The Micro User would stoop to the depths of blatantly supporting these cheap copies by displaying them on its front cover (May, 1985).

It is well known that these copies have no function key 6, and to align yourself with this movement can only bring the BBC Micro into disrepute.

I look forward to a reply to reassure me that you are still serving the legitimate BBC user.

Good magazine, keep going. – **Stephen Ibbs (14), Wolverhampton.**

● It's a well-known fact of publishing that mistakes are invisible until published. As soon as we received our first copies, hot off the press, we spotted it . . . and so, it seems, did many of our readers. The artist concerned now wears sackcloth and ashes.

. . . and the missing ROM

RE "ROM gone missing" letter in August Micromail, the DFS is most likely being switched off by the programs overwriting the byte responsible for indicating Disc/Net being present.

*This byte is at &DF0+ROM number of DNFS ROM. Writing &FF to this location disables the ROM even on Ctrl+Break. Try writing &7F to this location immediately followed by *HELP on a 'non-NET' micro.*

The "Disc transfer" letter on the same page is also easily explained.

This problem is usually due to an attempt to save to disc a program which starts with PAGE below &1800.

*When the *DISC command is given various locations in PAGE &17 are written to by DFS 0.9 two locations have &FF written to them so corrupting any program in this area.*

Yes, you've guessed it – &FF is the Basic token value of Oscli. So programs should be moved

→

MICROMAIL

From Page 153

up to &1900 before saving to disc. Hope that helps. – **M.V. Hamblin.**

● A quick check with our friends at Acorn revealed that the problem of the missing ROM is indeed to do with the last 16 bytes of Page &D being overwritten. These store the number of pages of dynamic workspace for the sideways ROMs present.

Of course, the amount of workspace needed will be limited, so the DNFS uses the top two bits of the byte to indicate the status of the NFS (bit 7) and the DFS (bit 6). The default is 0, which means the system's present. 1 means it doesn't exist.

The operating system doesn't alter this byte except at power up, so if you overwrite it with bit 7 set, your DFS disappears . . .

To recover it, assuming the DNFS is in socket &C or thereabouts, enter !&DFC=0 then press Ctrl+Break.

Calling all Lispers

I WRITE to ask if any of your Lisp-speaking readers would be interested in forming a corresponding circle devoted to that most interesting of all computer languages.

I am sure that devotees of all levels of expertise would benefit from an interchange of ideas and I envisage the production of a newsletter two or three times a year. – **John Wellsman, 294a Caledonian Road, London N1 1BA. Tel: 01-607 0157.**

A matter of interest

WOULD you help me in my need for a program for calculating compound interest over a given period of time and for a given yearly interest rate?

For example, if I saved £5 per week for 28 weeks at an annual interest rate of 8 per cent, how much interest would be earned?

I am informed that building societies and banks actually work compound interest out on a daily basis.

I am afraid I have only a limited knowledge of Basic so this kind of program would be beyond me, at the moment, but any help would be greatly appreciated – **M.J. Holmes, Rubery, Birmingham.**

● The following program calculates the compound interest on a weekly basis:

```
   10 REM CALCULATES ON A W
EEKLY BASIS
   20 REM SET PRINT FORMAT
TO TWO DECIMAL PLACES
   30 @%=&02020A
   40 PROCsetup
   50 PROCcompound
   60 PRINT "The answer is
£";running_total
   70 END
   80 DEFPROCsetup
   90 INPUT "What amount in
vested each week", amount
  100 INPUT "What interest
rate", rate
  110 INPUT "Number of week
s" weeks
  120 REM INITIAL SAVING (w
eek 0)
  130 running_total=amount
  140 ENDPROC
  150 DEFPROCcompound
  160 REM CALCULATE INTERES
T ON ONE WEEK
  170 weekly_rate=rate/52/1
00
  180 REM rate/52/100/7 FOR
 DAILY RATE!
  190 FOR compound=1 TO wee
ks
  200 REM CALCULATE INTERES
T DUE
  210 running_total=running
_total+(running_total*weekl
y_rate)
  220 running_total=running
_total+amount
  230 REM EACH TIME ROUND T
HE LOOP THE INTEREST IS ADD
ED TO THE CAPITAL.
  240 NEXT compound
  250 ENDPROC
```

Tackling Repton

WE have received enquiries from several customers regarding our new game Repton, asking whether it is possible to complete all 12 screens.

Could I assure Repton fans that all 12 screens can be completed without losing a life.

Screen J seems to cause the most problems. Some lateral thought is required to complete this screen.

Incidentally, the prize of £100 has now been won, but look out for Repton 2 . . . coming soon. – **Richard Hanson, Managing Director, Superior Software, Leeds.**

● We're grateful to Richard for this information. Now come on you Repton fans – you know you can do it!

Saving on memory

I AM writing a game in machine code for my cassette-based BBC Micro. I have a problem, however – the game runs out of memory.

The solution seems to be to implement a virtual screen window, which would reduce the amount of memory used up by Mode 2.

Certain games such as Sabre Wulf, Labyrinth and Manic Miner all use this technique.

I calculate that by setting up a window 20 × 22 in Mode 2, I would regain about 6k.

*I have managed to partly simulate this technique using the *TV to push the screen down and save about 2.5k. *TV249 allows to use the area from 7550 to 8000 for programming.*

Elite, I am told, uses a similar technique to change the screen from Mode 4 to Mode 5. It utilises some kind of interrupt.

I would be very grateful if anyone could help me. – **Mark H. Butler, Malpas, Cheshire.**

● You can create smaller screens, which require less video RAM, by changing several registers in the 6845 cathode ray tube controller – CRTC. The program below will create the 20 × 22 character display you require.

It can only be used from machine code as the new screen is foreign to the operating system.

This means that OSWRCH calls will have to be self written to cope with the new screen, otherwise, the old screen RAM which has been claimed will be corrupted.

The screen start address, in the program below, is now &4900 instead of 83000 thus claiming &1900 (6,400) bytes.

Brighter washdays

"PROGRAMMABLE" domestic washing machines seem rather to suffer from restrictions than to enjoy the freedoms which should result from the utilisation of microelectronics.

Cannot manufacturers take a leaf out of the electronic music industry's book and develop their own "Midi" or "Wishi" interface, so allowing the millions of home-computer owners, through appropriate software to have access to a totally flexible range of wash-day "programs"?

On-screen menus could allow selection of load sizes, prewashes, washing temperatures, agitation types and/or lengths, numbers, temperatures and lengths of rinses, and spin speeds and durations – all with default values, and over-ridable error-trapping, corresponding to the International Care Codes.

All these operations are already present in the wash-day hardware, so the computer software should be a doddle once it is given access to them. How about it, Hootpointdessi? – **Paul H. Holgate, Nottingham.**

● What a fantastic idea. But why just cater for the lady of the house? Why not a programmable dishwasher for hubby?

● ***Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

Here's a brief description of the registers used in the program:

Register 6 contains the numbers of character rows to be displayed.

Register 7 allows the screen's vertical position to be altered.

Registers 12 and 13 define the start address of the video RAM.

```
   10 start=&4900
   20 MODE 2
   30 COLOUR 129
   40 CLS
   50 ?&FE00=6:?&FE01=22
   60 ?&FE00=7:?&FE01=30
   70 ?&FE00=12:?&FE01=star
t DIV &800
   80 ?&FE00=13:?&FE01=star
t MOD &800 DIV 8
   90 FORL%=start TO &7FFF:
?L%=RND(256)-0:NEXT
```

'Explosion' is needed

I AM writing a program in Basic which involves using many user defined graphic characters.

In fact it uses far more than the allowed 32 – without, that is, exploding the character set.

I cannot do this, as it would mean losing valuable memory. Therefore, do you or any of your readers know of a way of storing UDGs at an unused address – for example &B00, the function keys buffer?

I have thought of redefining the characters as I need them, but this would be too messy, and besides, most of the characters are used on the screen at the same time.

I realise this will probably need a machine code routine, and that, I am afraid is beyond me . . . – **Neil Graham, Doncaster.**

● The easiest solution to your problem is to "explode" the character set.

This is done by executing *FX20,n where "n" indicates the number of extra re-definable characters.

For example,

n=1 gives 32 more characters
n=2 gives 64 more characters
and so on upto n=6 for 192 more characters.

For each "n" PAGE must be increased by &100 to accommodate the new character definitions. This is your only worry when exploding the character set.

Another solution is to use a machine code routine to "swap" between two character sets. This is considered as being naughty and clumsy because only one set of characters is available at any instant. More memory is also needed for the machine code routine.

The Demon again . . .

RE "Troubles with a Demon", Micromail August. I, too, am pleased to see that you are publishing the names of companies who deal fairly and unfairly with their customers.

I, too, together with many others, have had problems with the suppliers/manufacturers/distributors of the Demon Modem.

After sending my cheque for a modem, I was kept waiting and my letters ignored.

I sent copies of my letters to the Editor of Acorn User, the magazine which printed their advertisement. These, too, were

→

For Learner disc drivers...

I AM confused about the jargon on disc drives, so could you answer a few questions?

- *Are double-sided discs compatible with single-sided drives?*
- *Are 40-track discs compatible with 80-track drives?*
- *Is single and double density the same as 40 and 80 tracks?*
- *What is the difference between a disc interface kit and a DFS?*
- *Is the whole 32k of the Watford extension usable for programming in Basic?* – **Andrew P. French, Bristol.**

● You're not the only one who gets confused with discs and disc drives. Therefore, the following information should be useful to both you and anyone else thinking about upgrading to a disc based micro.

A disc drive can have either 40 or 80 tracks. Each track is used to store data, so the more tracks the greater the disc storage capacity.

The problem with having two different types of drives means that 40-track discs cannot be used on 80-track drives and vice-versa. That isn't strictly true because the Watford Disc Filing Systems – DFSs – are capable of reading 40-track discs in 80-track drives.

More popular are switchable drives which allow the drive to operate with 40 or 80 tracks. This makes it possible to use discs which have been formatted with 40 or 80 tracks at the flick of a switch.

You can also buy drives which are double-sided. With these drives both surfaces of the disc can be used to store data. These automatically double the capacity of each disc since both sides are used.

If you use double-sided drives you must remember that the second side cannot be read by a single-sided drive.

Next comes the disc interface. Before any disc drive can be used on the BBC Micro you must have a disc interface. This additional hardware is responsible for transferring data to and from the disc drive.

Part of the interface is the Disc Filing System (DFS) ROM which contains the software required to drive the hardware.

There are two types of interface available, single density and double density.

The density refers to the amount of data that can be stored on each track. A double-density interface can store approximately twice as much data as a single-density interface.

However, some double-density systems are unable to run certain commercial software packages. This is because the software was created on a single-density system and the disc has been protected.

However, several of the double-density interfaces are capable of reading single-density discs as long as the DFS permits this.

The Watford DDFS and the UDM DDFS are examples of this. However, as the disc protection becomes better the chances of the disc working on a double-density system decrease.

So the best thing to do is check that the software you wish to buy is compatible with the DFS you're interested in.

If you want to stay fully compatible with all software, you should stick to a single-density disc interface – it'll cost you, though . . .

Last of all are the discs.

You should buy discs to match the disc system you are using. So if you have a 40-track single-sided drive with a single-density disc interface, you should buy discs which have the same specification.

However, many people use 40-track, single-sided discs in 80-track, double-sided drives without any problems at all. So it's up to you which discs you buy.

We would still recommend that you pay a little extra for discs – it's better to be safe than sorry.

As for your final point, the Watford 32k RAM board will release extra memory for Basic programs because it reserves 20k of its memory for the screen display.

Thus, in Modes 0, 1 and 2 you'll be able to write much longer Basic programs – approximately 28k. However, in Mode 7 you'll only gain about 1k.

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ignored.

It was only after making a special journey to London to the Micro User Show last May, where I promised legal action if it was not delivered or my money refunded within seven days, that I finally did receive my modem – albeit without the Demon Rom which had been ordered at the same time.

I was most interested in Mr Lundie's comments about the various names and telephone numbers used, because I found a similar problem.

The names changed within the range Unicom Ltd. / Demon Ltd. / Rushworth Dales Group / Dealer Deals Ltd. all at the same address – 20 Orange Street, London.

It is also interesting to note that there is a connection between Rushworth Dales and Acorn User – as seen in advertisements for the Acorn User Exhibition – and that their advertising is done by Computer Market Place Ltd., at Orange Street.

I, too, would strongly advise your readers not to have anything to do with this firm. – **D. Shaul, Norwich.**

Appalling service

I READ with some interest the letter in the August edition concerning the Unicorn/Demon/DB Enterprises/Rushworth-Dales bunch.

In February we placed an official order for a Unicorn modem and were told that delivery would be three to four weeks.

Four months later, after many telephone calls and a series of "We're terribly sorry, delivery will definitely be in the next two weeks"-type answers, we were eventually told that they didn't accept official orders, only pre-payment orders, and that was why it had not been despatched.

Suddenly another modem offering the same facilities appeared on the scene under the name Demon.

The original order was cancelled and a Demon modem was obtained – very quickly – from Watford Electronics.

Problems very soon arose. Even the simplest of auto-answering programs failed to run more than once.

The second time the program was run the telephone line would be held open and a tone generated. The only way out is to Break or Control-Break.

After many telephone calls to the software guy at Demon – whom I rapidly realised were the Unicorn brigade – and absolutely no joy whatsoever, the software buff finally suggested that the solution was to hit the modem in case a relay was sticking, and if that failed, to exchange the modem.

Physical abuse had absolutely no effect, so back went the modem to Watford Electronics – who replaced it instantly and apologised profusely. No difference ...

Telephone calls to Demon and so on.

A listing of the program giving trouble was sent to Demon at their request.

Three days later, having had no telephone call, it became obvious from speaking to them that no-one had heard about this mysterious listing, so I dictated another listing over the phone.

Two days later another telephone call revealed that nothing had been done and I was told that it would be two days before they could get their hands on a BBC machine in order to try it out.

Two days later – back to Watford Electronics, having heard nothing.

They took the modem, software, auto-dial disc and shabby assortment of photocopied sheets – or instruction manual as it would normally be called – quite willingly in exchange for another manufacturer's modem.

All in all, the service from Demon/Unicorn has been appalling and there is also some doubt in my mind as to the quality of the supplied software.

If you have any way of avoiding them you could save yourself an awful lot of trouble – and maybe money. – **(Dr) James F. Bell, South Oxhey, Herts.**

I can live forever!

I HAVE found a way to get infinite lives in Micropower's game Ghouls.

First type:

```
PAGE = &2200 (Return)
```

then:

```
LOAD "GHOULI" (Return)
```

then when this has loaded, you delete line 140 and run this program and then continue as normal with the loading process.

I hope this has solved the problems of all you frustrated Ghouls players. – **Ewan Baker, Dunfermline, Fife.**

Othello for two

THANK you for many hours of pleasure obtained from reading The Micro User *and its excellent programs and articles – especially those written by Mike Bibby, who always manages to put enough humour into his articles to make even the most difficult subjects a pleasure to read.*

Recently I typed in the games-program Othello. Although a lot of thought is needed to beat the computer, it is still a "one man's game", and in the last few moves the player has time to take a bath, take the dog for a walk, or take a catnap before the computer has made its move(s).

As other members of my family insist on "time-sharing" I have made a few changes to the original program, which make it possible for two players to play against each other without the intervention of the computer. And, as a small encore, the current scores are shown under the title-name.

The insertion of – only – lines 720, 1660 and 1670 in the original program will print the current score, without changing the rest of the program. – **Robin Houchin, Coevorden, The Netherlands.**

● Thanks for the alterations and additions. As you say, they certainly add an extra dimension to what is already a superb game of cunning.

```
  375 PROCintro
  380 REM remove this line
  420 REM remove this line
  470 IFPL%=-1 PROCselplay
  480 PROCname
  720 ?(POKE%-1)=GRAPH%:?PO
KE%=255:NEXTK%,J%:PROCprint
:ENDPROC
 1200 DEFPROCadval:PROCname
 1470 DEFPROCshowplay
 1475 PROCmask(X%,Y%):PROCt
urn:AD%=0:PNT%=0:ENDPROC
 1620 PRINT'''''':PROCcount:
IFCO2%>CO% PRINTCHR$133"Con
gratulations!!";AA$;" You w
in."'' ELSE IF CO%>CO2% PRI
NTCHR$132"Good show, ";BB$;
" You win."'' ELSE PRINTCHR
$130"Well played!! We drew
this game."''
 1660 DEFPROCprint:PROCcoun
t:IF CO%>9 THEN 1670 ELSE V
DU31,16,3:PRINT CHR$129;CO%
;CHR$131;" - ";CHR$132;CO2%
;" ":ENDPROC
 1670 VDU31,15,3:PRINTCHR$1
29;CO%CHR$131;" - ";CHR$132
;CO2%;" ":ENDPROC
 1680 DEFPROCintro:PRINT TA
B(5,7)CHR$132;"Names of pla
yers, please."
 1690 PRINTTAB(10,10);CHR$1
34;:INPUT"1 > " AA$
 1700 PRINTTAB(10,12);CHR$1
34;:INPUT"2 > " BB$:CLS
 1710 FOR I=1 TO (10-(LEN(A
A$))):AA$=AA$+" ":NEXT
 1720 FOR I=1 TO (10-(LEN(B
B$))):BB$=BB$+" ":NEXT:ENDP
ROC
 1800 DEFPROCname:VDU31,2,5
:IFPL%=1 VDU131,157,129:PRI
NT"  ";AA$;CHR$148;CHR$156;
:ENDPROC
 1810 IFPL%=-1 VDU131,157,1
29:PRINT"  ";BB$;CHR$148;CH
R$156;:ENDPROC
```

Nightmare is over

I CAN sympathise with A.P. Cameron – Micromail, July – having trouble loading programs from a cassette recorder. I, too, had many of the problems which he has encountered.

I bought a W.H. Smith CCR800 recorder but reloading programs was a nightmare. I approched a BBC Micro supplier who suggested I fitted something like a 100k resistor in the lead to the cassette recorder – saving program lead – and he assured me no harm would come to the micro.

Since then – many months – I have had very little problem in reloading saved programs, even with less expensive tapes. – **C. Watkinson, Barton-upon-Humber.**

Mail merging

THE listing (right) provides a means of mail-merging with Wordwise Plus.

The program requires the use of the embedded command f1 PS X$ f2 in your main text wherever you want a string to be merged from a file on disc.

X$ should be replaced by whatever string name or names you are using in the mail-merge program.

The program should be loaded into an empty segment and the file names to be used amended as necessary.

In this version we use two files each representing, in sequence, the values we want our "dummy" strings in our main text, A$ and B$ to take. The files are NAME1 and NAME2 respectively.

Up to five files can be used at once. The longest file should be that for A$ or the program may finish before your text has finished printing.

It is activated from the main menu by pressing Shift and the function key representing the segment you have stored the program in.

The list of names or whatever your files contain should be on lines terminated with a Return except for the final entry, as below:

```
SEG1
John
Eileen
David
ENDSEG
```

The main listing follows:

```
CLOSE #0
A% = OPENIN "NAME1"
B% = OPENIN "NAME2"
SELECT TEXT
DELETE MARKERS
CURSOR TOP
REPEAT
DEFAULTS
CURSOR TOP
A$=GLF$#A%
B$=GLF$#B%
PRINT TEXT
DOTHIS
TIMES 500
UNTIL EOF#A%
P.">>>FINISHED<<<"
A%=GET
GOTO END
.END
CLOSE #0
DISPLAY
```

Congratulations on a consistently interesting magazine. – **Alan Calder, Milton Keynes.**

● Many thanks for your useful routine. We're fascinated by the potential of Wordwise Plus – it's a mini-programming language in its own right. If any of our readers have their own pet routines, why not write in and share them with us . . .

Upstairs, downstairs

WHILE the BBC Micro is one of the best around, I feel it suffers from one fault in particular. That is, it expects all Basic keywords to be typed in upper-case letters.

When typing in long pro-

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MICROMAIL

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grams, it would be better if I could type everything in either upper or lower case, and have the computer ensure that all Basic keywords end up in uppercase, and everything else – other than following REM or DATA – ends up in lower case.

Perhaps you or a reader may be able to provide a program to achieve this. – **M.E. Thompson, London.**

- You are asking your micro to do something it was never intended to do.

One possible way of achieving what you want is by using a word processor to develop your program. Then, by using a machine code program, your Basic text, from the word processor, could be turned into a Basic program with keywords in upper case and variables in lower case. Maybe one of our readers has already done this.

Field shift factors

RE field shift factors. Hats off to Andrew Simpson – Micromail, August.

How appropriate to correct one undocumented "feature" – the field shift seen after execution of:

```
FOR I=1 TO 40: PRINT I,;:
NEXT
```

by making use of another . . . using a space instead of a comma to achieve field formatting, for example:

```
FOR I=1 TO 40: PRINT I ;:
NEXT
```

Unfortunately it doesn't work with strings, for which Andrew's second solution may be used.

A more general solution compares the number of characters remaining in the current text window and takes appropriate action. For example:

```
   10 FOR  I=1 TO 40
   20 P=?&30A-?&30B-POS+1
   30 IF P < (@% AND 15) PR
INT
   40 PRINT STR$I,;
   50 IF P=(@% AND 15) PRIN
T CHR$8
   60 NEXT
```

As Andrew elegantly showed, the reason for the field shift bug is still not clear. – **Sebastian Lazareno, Ware Herts.**

And finally, with tongue firmly in cheek . . .

Taking the upgrade path

Dear Trev,

Why do things get so complicated? Why is it that Fate (usually in the form of Andrea) ensures that everything I touch becomes a disaster?

Never mind the eternal verities, I just want to know WHY ME?

It all started when I decided that enough was enough, I was going to upgrade to the B+. I'd been tempted by the special offer in the window of the Nice Byte:

"New Beebs for Old. Exchange your B for a B+. Please".

Apparently for an extra £25 and your old micro you got a B+ (and all the wonders that that entails), an Electron, Spectrum (with flat screen TV), several hundreds of pounds worth of software you've got already and, to make the whole thing worthwhile, a free copy of The Micro User.

What red blooded Beeb owner could resist such an offer, particularly when I'd got the spare cash in hand? This had come as hush money from Andrea for not telling the bell ringers that she'd played away at Romchester Cathedral.

They're a xenophobic lot. If they'd known she'd done a foreigner she'd have been out on her ear. I asked A. if it was worth it but she said that she'd had to pull a lot of strings to get the rope.

I'd hoped to get the whole thing done without A. knowing but she saw me getting into Clive's car with it tucked precariously under my arm and that was that.

"Where are you taking that?" she bawled as she hurtled towards me. Clive took one look at her, said "I'm sorry, I didn't know he couldn't play out", and shot off down the road.

"I'm taking it down to the Nice Byte to part exchange it for a B+", I stammered, seeing all the curtains in the street start to move.

"What, without giving me the chance to say goodbye?" she howled, with something suspiciously like a tear in her eye. I caught a glint of sunlight reflecting from number 11's binoculars.

"Why are you doing it?"

"Well, the B+ is better", I said quietly, wondering if they'd set up the directional microphones yet.

"Oh, just typical of a man", she roared, just in case they hadn't. "That micro has given you the best years of its life and now, just because a flashier one comes along, you have to have it".

"Well actually it looks just the same", I equivocated (yes I have been using a vocabulary improvement program). I knew it was a mistake before I'd finished the sentence.

"If it's just the same why spend good money on another?" came the triumphant scream.

At this point the curtains became even more animated and Buster started attacking the Beeb's plug, which I'd dropped during A.'s first assault. It also started raining.

I know when I'm beaten and began to trudge up the drive followed by a manic cat and an even more manic wife.

"Have you no heart? What about all the late nights when you first got it, all the tears and suffering? Remember the joy when you got your first program to work? Don't give up now, you'll write another".

Well, Trev, I'm adult enough to know when I can't win, so I gave up the idea of a Beeb Plus, sank down on the couch and sulked. I just wish A. could be as rational.

"What did you want it for?" she persisted.

"Well it's got more memory".

"You said when you had your ZX81 you couldn't see why anyone needed more than 1k".

"Jim Notman says you can run large programs in Mode 0", I retorted.

"Only Jim Notman would want to run large programs in Mode 0", she replied nastily. Mind you, she'd got a point.

"Anyway, can you trust a man who admits that the first thing he does when he gets a new operating system is to dissemble?"

"Well it's got paged RAM", I yelled as one last, desperate shot.

"Disgusting", she said, doing her amazing imitation of a cross between Thatcher and Whitehouse. "If I'm satisified with it, you should be satisfied as well".

And that was that, I never got my Beeb Plus. Mind you, I still had to go down to the Nice Byte to get a new power unit put in my old Beeb. Buster's ministrations had seen off the old one and my £25 in one go.

Not that I'm too sorry. Maybe A. has a point. It does seem a bit unkind to cast aside my old Beeb at the first chance.

Still, I regret the missed opportunity. I could have done with a free Micro User. Cheers.

Bob

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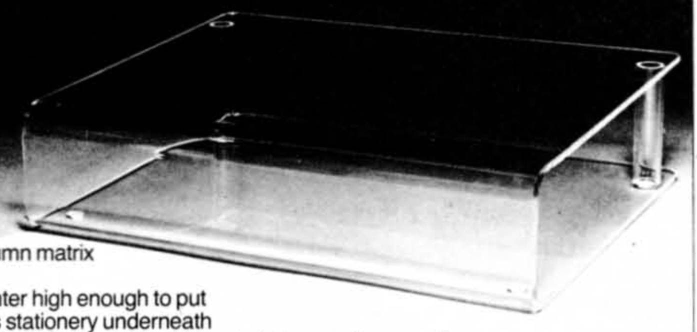

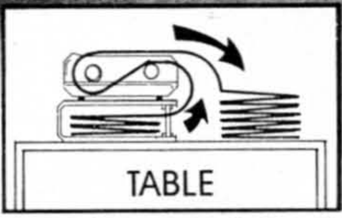

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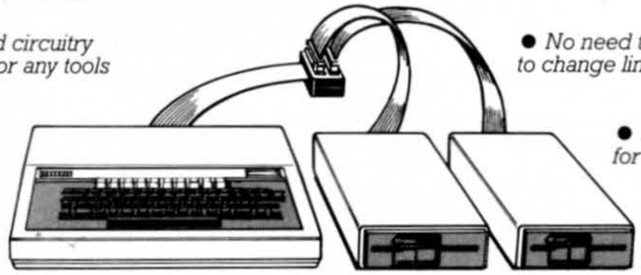

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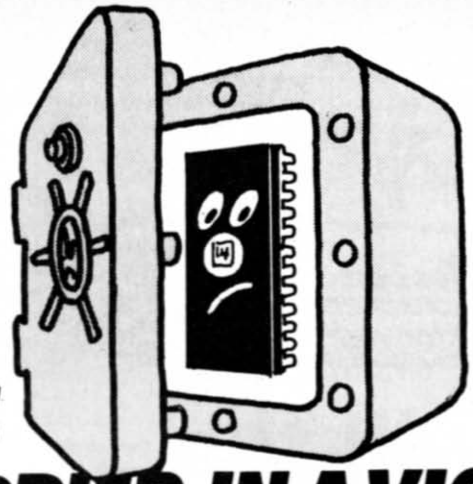

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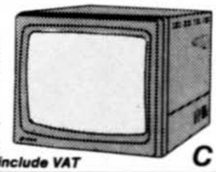
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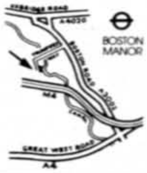

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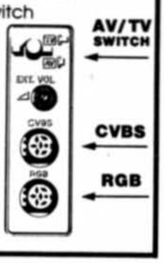

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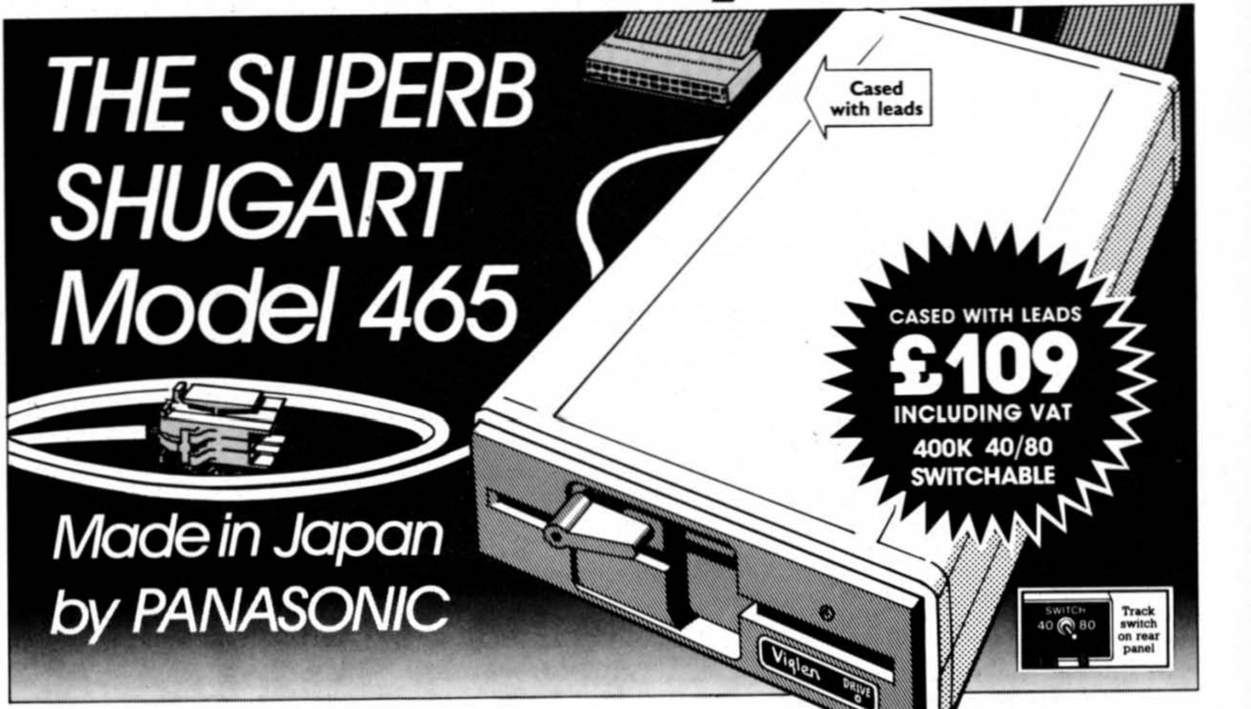
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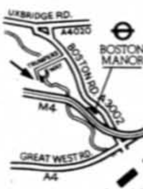
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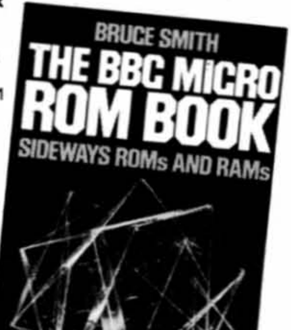

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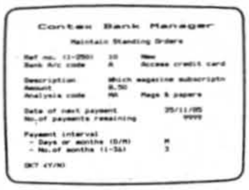

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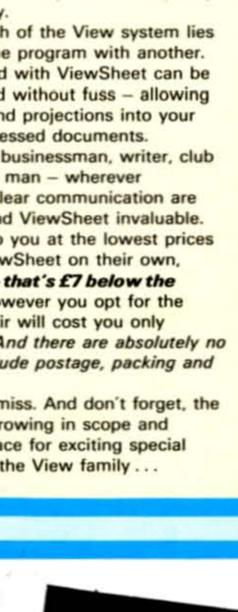
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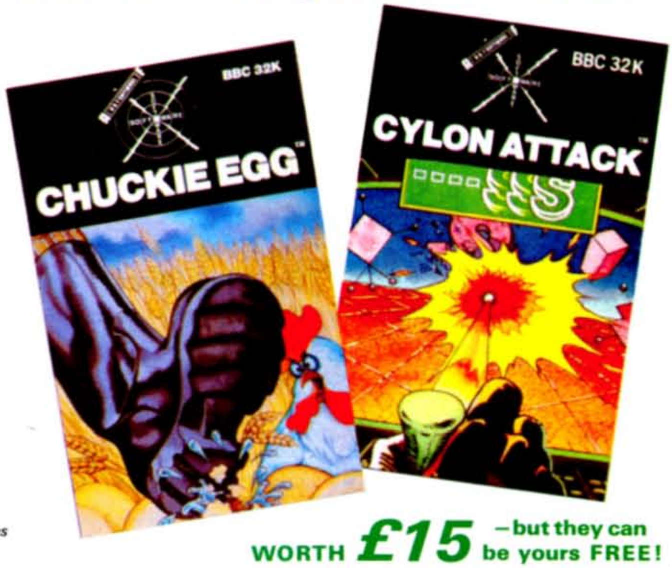

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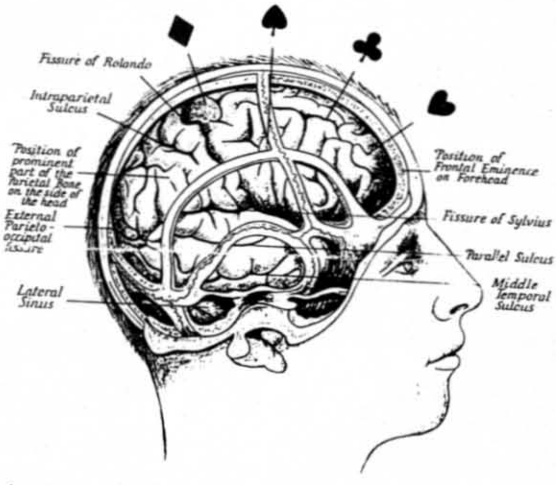
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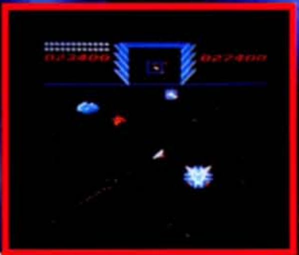

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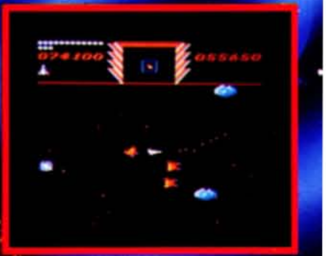

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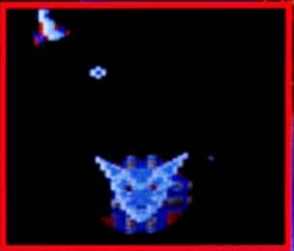

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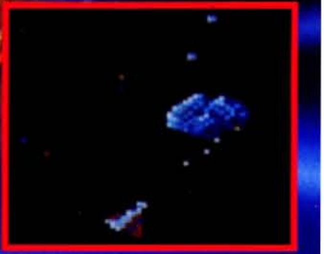

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